RAILROAD GAZETTE

FRIDAY, JANUARY 16, 1903.

CONTENTS

ILLUSTRATED:
Gölsdorf Compound Locomotives ... 41
A Combined Switch Engine and Crane ... 42
An Electrically Operated Oil Circuit-Breaker for High Tension Circuits ... 43
The Railroad Supply Club ... 44
Smith's Tie Plate ... 46
Eben Briggs Thomas ... 47
CONTRIBUTIONS:
The Need of the Block System ... 39
EDITORIAL:
Underground Telegraphs ... 48
Timber Cultivation ... 48
Freight Traffic in Russia ... 49
November Accidents ... 49
Editorial Notes ... 48
New Publications ... 49
Trade Catalogues ... 49
MISCELLANEOUS:
Steam and Trolley in Massachusetts ... 39
Michigan Railroad Commissioner's Report ... 40
The Injury to the Cables of the New East River Bridge ... 41
The Cables of the New East River Bridge ... 42
The American Pacific Cable ... 42
The British Westinghouse Works at Trafford Park, Manchester ... 42
The New York Terminal of the Pennsylvania Railroad ... 43
Train Accidents in the United States in November ... 45
Some Dangers in Electric Railroads ... 46
Railroad Conditions in Natal ... 46
Imports and Exports of Iron and Steel—Eleven Months ... 46
Electric Railroads to be Built During 1903 ... 47
Interlocking in Texas ... 47
The Training of the Special Apprentice ... 50
Long-Distance Electric Railroading ... 50
GENERAL NEWS:
Technical ... 51
The Scrap Heap ... 52
Locomotive Building ... 53
Car Building ... 53
Bridge Building ... 53
Meetings and Announcements ... 54
Personal ... 54
Elections and Appointments ... 55
Railroad Construction ... 55
General Railroad News ... 56

Contributions

The Need of the Block System.

New York, Jan. 3, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

It must have been an inspiration which brought about your remarks in the *Railroad Gazette* of January 2 entitled "Forty-nine Passengers Killed." It is the beginning of a new year; and although you have expressed the same sentiments many, many times before—always eloquently and very much to the point—yet there is a rush in this instance, an accumulation of force as you drive your facts toward the conclusion, which partakes of prophecy, and gives hope that the coming 12 months may see a growth in block signaling which will surpass that of any similar period in this country. Although *only* four employees and no passengers were killed in the collision which is described in the newspapers of this morning, coming as it does so closely in the track of your "Forty-nine Passengers Killed," impels me to call attention to the coincidence.

But in another editorial in the same issue: "Single Track Automatic Block-Signaling," which comments on the results obtained through an installation on the Southern Pacific, I find the following: "When we are going to run trains on single track without the delays due to sanding, repeating and delivering telegraphic train orders?" and "In view of the great savings on double track lines by increasing their capacity by the use of automatic signals, this seems on the face of it to be an unsatisfactory result."

Yet to me and many other readers, this does not seem so. A daily average of 47 trains on single track is very smart work; and when it is performed with *complete immunity* from collisions and total delays of but 208 minutes due to danger signals during a whole year, I cannot regard it as anything less than splendid. Moreover—and here is an important fact—the schedule shows but 31 regular trains, hence a daily average of 16 (one-third of the total) must have been extras with all of their disturbing qualities. Nor, again, is there anything to show that the facilities of this 43 miles are pushed; quite the contrary I should say, judging from the very small—really inconsiderable—delays which amount to an average of seven-tenths of a second per train over a distance of 43 miles!

Personally, I believe that the double train order is cumbersome and unnecessary when it is coupled with a rational block system. But I believe it only in the abstract. In the concrete and in connection with the many delicate and difficult questions which an operating officer must face, one cannot but agree that it will only hamper a block system in an unimportant degree and may be of immense value in less evident matters.

If the double train-order is cumbersome and unnecessary, it will fall of its own weight, to be joined later by the flagman, the flare and the torpedo, and I believe most strongly that it is better to leave them to the ordinary processes of dissolution. GEORGE HEBARD PAINE.

Steam and Trolley in Massachusetts.

BY CLARENCE DEMING.

An imaginary north and south line drawn through the State of Massachusetts a little to the west of the city of Worcester divides the State into two nearly equal parts. West of the line there is a population of about 591,000, a considerable fraction of which is in the lowlands of the Connecticut River Valley. East of the line there is a population of 2,214,000 with its nucleus at Boston. In percentages approximately 21 per cent. of the population live west of the line and 79 per cent. of the population on the eastward. In the western half there are 6 incorporated cities, in the eastern half 27. The western part, the Connecticut Valley excepted, may be considered rural; the eastern part is urban to a degree perhaps unequaled by any like area on the globe.

The street railroad system of Massachusetts distributes itself naturally to accord in a general way with the centralities of population. By the last printed returns of the Railroad Commissioners of the State there were 2,177 miles of such railways in the commonwealth. Of these, about 350 miles, or 16 per cent., are west of the supposed median line and about 1,827 miles, or 84 per cent., on the eastward. In western Massachusetts between the Connecticut and Housatonic Valleys, partly inclusive, there is a continuous area of about 1,000 square miles, or one eighth of the State, entirely destitute of electric railways. At the other extreme in eastern Massachusetts and in and around Boston, those railways focus in a thick maze of lines representing every form of situation, construction, character of business and relation to other roads—lines that often parallel several steam roads as well as other street railways, lines urban and suburban and interurban, "summer" lines to the beaches, lines (in Boston) underground and elevated and, less often, lines of a purely cross-country character. That such a region as eastern Massachusetts, abounding in surplus capital, the densely populated tract of a State itself second among the States of the Union in ratio of population to square mile, should evolve a vast, ramified and varied system of electric roads is a logical inference which the fact confirms most vividly.

Electric power was first used successfully by a Massachusetts street railway company upon the Lynn and Boston line in July, 1888; on the West End line in February of the following year, and in August of the same year on the Boston and Revere line, which was the first in the State to be wholly equipped with electric power. By 1892 more than half of the street railway mileage of the State had been equipped by electricity, and the era of electric expansion may be said then to have fairly begun. The growth, since and including that year, of the electric railways of the State in comparison and contrast with the relative stagnation of the steam companies is set forth in the tables following:

Mileage.

	Street railways.	Steam railroads.
1892	755	4,043
1893	874	4,151
1894	929	4,210
1895	1,078	4,228
1896	1,277	4,288
1897	1,414	4,294
1898	1,538	4,336
1899	1,736	4,362
1900	1,913	4,416
1901	2,177	4,416

Capital Stock.

	Street railways.	Steam railroads.
1892	$23,590,536	$174,513,552
1893	25,883,575	186,440,423
1894	26,971,275	191,892,697
1895	27,906,685	193,506,847
1896	30,727,818	205,105,977
1897	32,670,273	205,671,652
1898	38,933,917	205,766,507
1899	41,380,143	213,255,282
1900	48,971,168	216,213,263
1901	54,069,933	210,305,886

Gross Debt.

	Street railways.	Steam railroads.
1892	$15,204,278	$120,644,324
1893	23,706,113	134,110,609
1894	26,049,020	150,168,246
1895	27,450,396	153,232,673
1896	30,389,896	158,517,733
1897	33,813,141	161,682,090
1898	36,955,708	161,913,019
1899	41,899,748	162,108,411
1900	46,091,778	160,795,628
1901	49,528,109	175,111,401

Passenger Train and Car Mileage.

	Street railways.	Steam railroads.
1892	29,678,036	23,548,735
1893	34,507,282	26,041,383
1894	36,722,978	25,118,810
1895	43,655,560	24,302,800
1896	53,613,685	26,392,246
1897	61,577,917	26,236,109
1898	68,206,418	27,046,501
1899	73,367,235	27,749,110
1900	81,750,768	28,220,270
1901	93,005,225	28,528,070

Passengers Carried.

	Street railways.	Steam railroads.
1892	194,171,192	110,915,454
1893	213,552,009	119,779,947
1894	220,464,099	109,434,184
1895	259,794,308	107,856,348
1896	292,358,943	111,629,051
1897	308,684,224	102,743,890
1898	330,889,629	101,940,722
1899	356,724,213	102,043,980
1900	395,027,198	108,768,303
1901	433,526,935	108,758,528

Gross Passenger Earnings.

	Street railways.	Steam railroads.
1892	$9,798,060	$32,211,733
1893	10,832,174	35,579,616
1894	11,119,846	33,252,621
1895	13,184,342	33,396,319
1896	14,844,262	36,395,024
1897	15,815,267	34,745,628
1898	16,915,405	34,680,057
1899	18,157,550	35,325,236
1900	19,999,640	37,732,243
1901	21,766,340	37,788,899

The table for mileage, in the case of both the steam and street lines, refers to single track within the State of Massachusetts. During the decade the street railway mileage increased 188 per cent., the steam railroad mileage only a little more than 9 per cent. and during the last year of the decade it did not increase at all.

The tables, further analyzed, become exceedingly suggestive. The industrial depression of the early part of the decade gave obviously but little pause to the advance of the Massachusetts trolley system. For the whole decade the street railways increased their capital stock about 130 per cent. as compared with about 21 per cent. for the steam roads, corresponding figures for the gross debt being about 226 per cent. and 45 per cent.; for passenger train and car mileage about 213 per cent. and 21 per cent.; for passengers carried, 123 per cent. and 2 per cent. *decrease;* and for passenger gross earnings 122 per cent. and 17 per cent. The most impressive of the foregoing tables is that for passenger earnings indicating clearly heavy gross losses from trolley competition during the three years following 1896 and not overcome until the existing wave of industrial prosperity began its sweep. But perhaps the most instructive table is that subjoined, showing by the Massachusetts returns the progressive extension of the average passenger journey in miles on the steam roads as the result largely of suburban trolley competition:

Average Passenger Journey.

1892	14.35	1897	16.29
1893	14.56	1898	16.47
1894	14.85	1899	16.82
1895	15.17	1900	17.08
1896	15.89	1901	17.09

The table indicates an increase of 2.74 miles, or a little more than 19 per cent., in the average passenger journey—and that result in spite of the effects, during the decade, of the growing use of the long distance telephone, the influence of which as a factor in reducing the average railroad trip must be considerable, while, in the necessary absence of statistics, it can only be guessed. As a general theorem it seems plausible to say that, for a term of years and up to the industrial revival, the effect of acute trolley competition on the steam roads in Massachusetts was to cut them off from what would have been their natural increase in passenger travel. The theorem must wait for partial or complete demonstration until the wave of prosperity, which has in a large measure allowed the steam roads to recover, itself recedes.

To explain more fully the fiscal aspects of Massachusetts trolleys and their bearings on the steam roads a brief statement of some of the leading points of the street railway statutes of the State, applying, in many cases, to steam roads also, is timely. Under the Massachusetts law (1) the amount of capital stock of a street railway corporation must not be less than $10,000 a mile, unless the line is wholly outside of a city and, in that case, not less than $2,500 a mile; (2) ten per cent. of the par value of the stock must be paid in at the outset; (3) the capital must be fixed at an amount approved by the Railroad Commissioner, but must not exceed the fair cost of replacing the road and property acquired, less the amount of outstanding mortgages, and the Railroad Commissioners have, on these points, power to determine; (4) until all the stock is paid in the directors of a street railway company are liable for its debts and no certificate of stock can be issued until the par value is actually paid in as cash; (5) a street railway company cannot issue bonds, coupon notes or other evidence of indebtedness to an amount which exceeds, in the whole, the amount of stock actually paid in (but this does not apply to refunding of bonds issued before 1897); (6) in fixing capitalization the value of the franchise is excluded; (7) there can be no grade crossing with steam roads without consent of the Railroad Commissioners; (8) half fares for school children are established by law; (9) a street railway company can issue stock and bonds on pleasure grounds, but only under the restriction of the regular law and with the approval of the Railroad Commissioners; (10) corporations can only consolidate if public facilities are not reduced, fares not increased and there is no expansion of stocks and bonds of the combined roads in consequence of consolidation; (11) unless the privilege was specifically granted prior to March, 1897, a street railway corporation has no right to carry on an express or freight business; (12) a majority of the directors must be inhabitants of the municipalities in which the street railway is located; (13) local governing bodies pass on the layout of the line and on questions of public convenience and necessity, but property owners can appeal to the Railroad Commissioners; and (14) the Commissioners must fix the price of new stock issued to stockholders—in other States "melons" so-called—at not less than market value.

At the last session of the Massachusetts legislature a bill was passed giving the Superior Court power to appoint a commission to abolish a grade crossing with a steam road subject to the approval of the Railroad Commissioners.

A brief glance at these provisions of Massachusetts railway law proves that the State adopts the theory of vesting great powers and responsibilities in the Railroad Commission of three members nominated each for three

years by the Governor and confirmed by the State Council, paid each $4,000 a year, with $1,000 added for the chairman and aided by an office force of two clerks, an accountant, a bridge engineer and four railroad inspectors. Before that body there comes each year an immense variety of questions, ranging from the petition of a single individual for a reduction of fare or of a local freight rate up to the approval or veto of a big issue of stock or bonds. The history of Massachusetts steam and electric roads, their finances, their physical development and their relations with each other has been almost wholly the expression of the polity of the Railroad Commission whose decision, couched in the gentle verb "recommend," has been usually final.

The attitude of that potential body during the last decade of swift trolley expansion shows that it has acted consistently as a kind of "buffer" between the steam and electric interests. It has taken a pretty definite stand on the basic theory that the steam railroad and the street railway each has its well marked sphere of operation. To the former, the Commission has declared, belong normally the freight traffic, the express business and longer distance passenger travel; to the latter municipal and suburban passenger traffic—though, of late, the Commission has veered somewhat toward sharper steam rivalry with the trolleys in suburban travel as a device to keep down street railway fares. The cross-country and strictly rural line in Massachusetts, while not thwarted, appears, under this general policy, to have been definitely discouraged. Under the Massachusetts law the steam companies are not authorized to build new electric roads or electrify old steam lines. This measurably protects street railway interests. On the other hand the steam roads find cover in official discouragement of long electric routes, in the prohibition of freight and express carrying by the trolleys in the barring of them from their own roadbeds and quicker time and, most important of all, in the severe blocking off of "promotion" schemes and inflated financing of parallels. While, therefore, rivalry of steam and electricity has often been acute in suburban traffic it has been, in the main, of a short distance character, and conflicts of the two interests have almost never been joined in the Massachusetts legislature or courts. Exceptions to the rule of the use of electricity by a steam company may be noted in the cases of the Nantasket branch of the New York, New Haven & Hartford Railroad Company and its operation by trolley of a road from Worcester to the Connecticut State line. They are explained officially, in the latter case, by the fact that the New Haven Company acts as a Connecticut corporation and, in the former instance, by a special legislative act.

The effects of the strict Massachusetts law combined with the valuation of the Commissioners sitting as a kind of high Court of Railroad Appeal, in checking the common disease of street railway inflation of stocks and bonds is a most interesting phase of the general subject. At the outset of the period of rapid trolley-building in Massachusetts there was complaint of the inadequacy of the old statutes—applying only to horse railways—to meet the new financial conditions; and on a technical defect a certain limited number of companies appear to have dodged the statute and issued so-called "coupon notes" to excess while restrained effectively by the statute from the over issue of bonds secured by mortgage. But the evil did not go far, and the remedy was prompt. The spirit of the Commissioners in meeting the abuse may be fairly illustrated by its dealing in 1896 with the Interstate Consolidated Railroad Company operating both in Rhode Island and Massachusetts. That corporation had obtained in the former State the right to issue stock and bonds of $650,000, and sought the same right from the Massachusetts Commissioners. The Board found that the amount far exceeded the duplication value of the property, refused the application and only authorized a capitalization of $317,200 to be based upon immediate improvements to that amount. The Board itself in one of its reports ten years ago cited the cases of six companies which collectively had issued bonds and notes of $2,400,000 against $1,118,000 of stock, or $1,282,000 beyond the normal limit. In another instance it appeared that seven corporations had paid in capital stock of $2,575,000 with outstanding bonds of $5,115,000—or $2,540,000 in excess of the law—but at the same time other companies had $23,308,575 of paid up stock and but $8,993,000 of bonds. Other cases, but not many, of bond inflation have probably been inherited from the earlier and looser period of street railway expansion.

The sworn returns from the street railway companies of Massachusetts do not require statements as to stock paid in as cash and the ratio of actual inflation, therefore, cannot be even surmised. But that it is low may be suggested by a test derived from the opposite extreme in Connecticut, where trolley stock watering has been rife. In that State the 516 miles of trolley roads are capitalized in the last Railroad Commission report in stock and debt at about $78,000 per mile, as compared with only $45,757 per mile in Massachusetts, notwithstanding the great mileage cost of the plants in Boston. The only qualification in the Connecticut figures is the fact that they include capitalization of a few lighting plants the relative slight value of which does not vitiate the comparison of Massachusetts with a sister New England State where the legislature and the Railroad Commission have alike been inert and inefficient in checking trolley stock watering. Another token of successful resistance in Massachusetts to the familiar "bond and bonus" schemes of promoters and syndicates is the action of the last legislature of the State in opening to savings bank investment the bonds of street railway companies certified by the Railroad Commissioners to the savings bank commission as having earned not less than five per cent. on stock for five consecutive years. Taking the stand that the law as to capitalization of electric railways—which do not own their roadbed and are subject to variations of municipal ordinance—should be applied even more rigidly than to the steam corporations, the Railroad Commissioners, with singular success in view of the obstacles, have made the statute a fact.

The subject of the fiscal inflation, actual or potential, of Massachusetts street railways must not be dismissed without reference to a unique organization, the Massachusetts Electric Companies, which, in 1901, was made the subject of special legislative inquiry. The Railroad Commission reported that it was a "voluntary association" issuing trustees' certificates for preferred shares of $15,057,400, coupon notes for $2,700,000, and common shares of $13,718,100, and paying 4 per cent. on its preferred shares, its profits being derived from holdings of controlling interests in seven electric railways and one electric light corporation—the railway companies representing consolidations of 31 original street railway corporations together carrying $9,777,500 of capital stock. The Commission reported that it had practically no control of this "holding" association, but that the anti-stock watering laws of the State applied to the constituent railways. Whether this device of a kind of hybrid between a partnership and proprietary company will avail in dodging the Massachusetts statutes, the sequel in future years will prove.

Consolidation of street railways in Massachusetts has been extensive and continuous. The Massachusetts Electric Companies case, just described, is an illustrative instance, though not typical. In the year 1892 there were 60 operating street railway companies in the State; in 1901 there were 99, and in the interval no less than 93 companies had been absorbed. Consolidation of the lines has usually brought better service, decidedly cheaper fares and, by virtue of the severe and honestly enforced statutes, not often been attended with the stock watering which such mergers have so often screened in other States.

Special experiences in trolley competition of the great steam lines entering Boston, as narrated by high officials of the steam companies, are of interest. On official authority of the Boston & Maine it can be stated that trolley competition for Boston-Somerville traffic reduced the steam passenger business 50 per cent., and that such was the decrease of the Boston & Maine's general suburban traffic that enough passenger cars were released from suburban for general service on the system as to exempt the company from new passenger car purchases for several years. Examination, however, of the Boston & Maine annual returns does not fully confirm the latter statement. On the South Framingham and Milford branch of the Boston and Albany system the opening of a close trolley parallel between the two stations several years ago reduced the steam passenger traffic more than 50 per cent. The Boston & Albany finally met the rivalry by doubling its service, and reducing fares to that of the trolley. At the end of three years the steam company had increased its receipts 68 per cent. and the number of passengers carried 214 per cent.—and this with but slight increase of operating expense, partly because unexpended time of train crews happened to be available. The experiences of the same corporation on its Boston suburban loop line some 25 miles long have been novel, and may prove instructive. For the five years succeeding 1894 electric competition cut down the steam traffic on the loop progressively until there was an annual loss of about 1,500,000 passengers and $127,000 in receipts. So serious was the strain that the Boston & Albany meditated a cut to meet the trolley rate and actually asked for a meeting of the railroad presidents to consider "community of interests" in taking the step. But the matter was deferred pending legislative consideration of the general subject. Suddenly last year, without apparent reason, the steam company began to get back its business, and at the end of the year had recovered about 1,250,000 passengers and reduced its annual loss from $127,000 to $74,000—a slight improvement made in train service being quite insufficient to account for the change. On its Lynn & Boston line—of about 14 miles—the passenger traffic of the Boston & Maine suffered severely from electric competition during the hard times beginning in 1893, but has since largely regained traffic, the returns reflecting impressively the "time" element in such rivalry, the Lynn factory workers choosing the quick steam or slower trolley, according as they are employed or idle. The opening not very long hence by the Boston & Albany and the New York, New Haven & Hartford companies of electric suburban service around the loop constructed below their great South Terminal Station forecasts competitive results south and west of Boston which may prove sensational.

For definite returns showing the results of Boston suburban trolley competition with the steam roads no figures are available. There is a clue, however, in the following table of returns for number of passengers in and out of Boston on steam roads during the decade ending with 1900:

1891	51,294,903	1896	53,499,695
1892	54,151,859	1897	49,691,215
1893	56,581,541	1898	48,967,467
1894	52,756,601	1899	49,174,631
1895	52,015,921	1900	52,334,148

The figures suggest that electric competition was powerful enough to reduce the gain in steam passengers for the end of the decade to about 2 per cent. and during the three years preceding inflict a positive loss—this in spite of the gain from "prosperity" of Boston passenger traffic to and from the extra-suburban region.

Managers of the large steam roads centering at Boston derive some negative comfort in trolley competition from the fact that it attacks their short distance travel, the least profitable branch of steam railroad operation. Their most serious criticism of the policy of the Railroad Commission is aimed at its fixing a rule for overcrowding and uncleanliness for steam cars which is relaxed for the trolleys—a criticism which the visitor to Boston must pronounce just. What the steam companies dread most now is electric extension to long distance traffic—perhaps already foreshadowed if the report of coming fast electric service between Boston and Worcester is well-founded. It may be added here that, unlike Massachusetts, New Hampshire authorizes the steam companies to build and operate electric roads, and the Boston & Maine operates two such lines in the State, each about 16 miles long. One of them has barely paid running expenses, the other has been operated too short a time for informative returns.

In the broader outlines of the future of the electric and steam transportation systems of eastern Massachusetts there are two impressive forecasts. One of them relates to the problem which still awaits solution in the city of Boston. In that municipality, the business heart of vast suburbs, its traffic congested in streets not merely narrow but sinuous to the last degree, the subway and elevated lines seem, as yet, hardly to have relieved visibly the strain of city traffic. Rivers of population still pour through its mazy thoroughfares and overflow from sidewalk to roadway, while the pervasive trolley car creeps intermittently rather than moves. The density of travel and traffic in not a few of Boston's busy streets amazes the Londoner from Cheapside and the New Yorker from lower Broadway not less than the ancestral folly in his city's layout amazes the Bostonian himself. How the tension will ultimately be loosed—by exclusion of surface cars from the crowded streets, by elevated roads or, as is more likely, by an extensive system of subways radiating from a great central station to the suburbs—is still a highly speculative question. It is certain that the present short subway and elevated tracks have only touched the edge of the trouble.

More important, if less immediate and imperative, is to be the evolution of steam and electricity in the whole eastern half of Massachusetts with its 27 cities and its population in an area of 4,000 square miles exceeding the ratio of population to square mile in England. Hitherto various forces already outlined, but, particularly, the policy of the State as expressed by the rulings of her State Railroad Commission, have kept the rival interests apart. Serious as has been the traffic rivalry at points steam and electricity have been passive in legal and legislative antagonisms. Steam still controls the longer distance, while electricity rules the suburb. But as the suburb expands, the separative forces must lose their power. Electric transit must become interurban, quicker, further reaching and generate contacts and collisions with the steam roads more and more frequent and grave. How the strenuous rivalry will at last be worked out—whether by consolidation on a vast scale or, as seems most probable, by electric equipment of present steam roads for long transits—is a query not limited in kind to Massachusetts. But along her densely settled littoral and eastern mainland is the region where that query may be answered soonest.

Michigan Railroad Commissioner's Report.

An abstract has been issued of the 30th annual report of the Commissioner of Railroads for the State of Michigan. The length of railroad in the State as shown by the reports of the companies for the year 1901, was 8,199 miles, an increase of 253 miles in the year. The commissioner continues his opposition to grade crossings of steam and electric railroads, and no new crossings of electric lines with main tracks of steam railroads have been approved. The opposition of builders of electric lines to this stand of the commissioner has nearly died out. In the city of Ann Arbor a number of street grade crossings are being abolished.

The commissioner recommends legislation to better define and enforce his authority to require suitable station facilities and to give him authority over electric railroads. The law requiring the use of automatic couplers and air-brakes should be made to harmonize with the Federal law on the same subject.

In view of the great importance of the question of freight rates, the subject is earnestly recommended to the Legislature. The Commissioner also suggests the advisability of legislation to require the use of electric lights in passenger cars.

The suit of the commissioner against the Grand Rapids & Indiana to compel the road to reduce its fares to 2½ cents a mile was decided in favor of the State, but has been appealed to the Supreme Court of the United States.

The number of persons killed on the (steam) railroads of the State during the year 1901, was 162, and of injured, 638. The number killed is the largest ever reported except in 1900. In the collision at Seneca, in November, 1901, the great danger connected with the use of light, frail cars in passenger trains was emphasized, and this was called to the attention of the railroad companies of the State. The report of accidents to men occurring in coupling and uncoupling cars shows a grati-

fying diminution. In the sparsely settled northern portions of the State during the winter, when the snow is deep, railroad tracks are much used by pedestrians, and the commissioner thinks that this dangerous practice should be abated; but he does not seem to know exactly how to go to work to do it.

Göldsdorf Compound Locomotives.*

BY REGINALD GORDON.

The Gölsdorf system of compounding is now in extensive use in Europe, where, a year ago, there were more than 1,700 engines of this kind in service; this number including both two and four cylinder compounds. They are used in all kinds of service and on any grades that can be worked by the simple locomotive. The Gölsdorf compound has as yet hardly been tried in the United States, although the Pennsylvania built a two-cylinder compound mogul about six years ago.

Nearly all compound locomotives, particularly those with only two cylinders, need a special starting mechanism to introduce live steam into the low pressure cylinder. But even when it is of the simplest design and fitted with the greatest accuracy, an intercepting valve, or other apparatus, is difficult to keep perfectly steam tight, and requires constant attention.

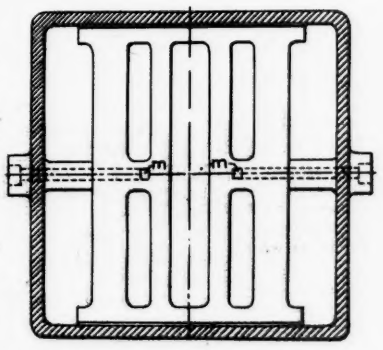


Fig. 1.

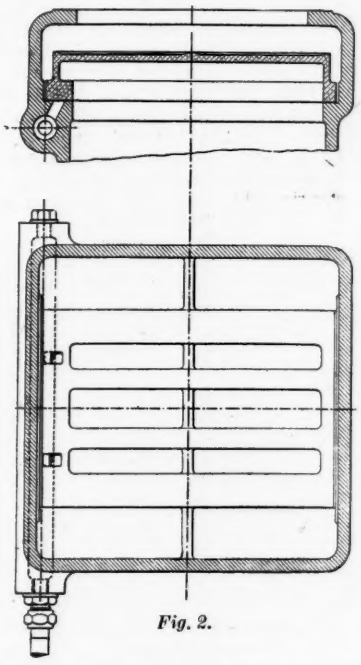


Fig. 2.

Valve Seat of Gölsdorf Compound—Two Arrangements for Admitting Live Steam to Low-Pressure Cylinder.

The Gölsdorf system possesses a great advantage over others in that it has no intercepting valve or additional moving part as compared with a non-compound locomotive; and might almost be called automatic in its operation. The low pressure cylinder is cast with two small ports in its valve face, and these ports communicate with a small pipe leading from the main steam pipe from the boiler. Figures 1 and 2 show two plans of the low pressure valve face, as used in Europe, one with the live steam connection tapped into both ends of the valve face at a point about half way across it, and the other having a pipe run along the side of the low pressure steam chest nearest the saddle. Figure 3 shows the design of the Gölsdorf compound built by the Pennsylvania, having a cross-over pipe through the saddle to the low pressure steam chest.

These small ports for the introduction of live steam are so placed that when the valve motion is in full gear forward or backward, on opening the throttle, steam enters the high pressure steam chest and at the same time the low pressure chest by one of the small ports shown in Figs. 1, 2 and 3. After moving the low pressure piston, the live steam passes into the receiver and thence to the (then) exhaust side of the high pressure piston. As soon as the engine is fairly started, and the valve gear hooked up, the low pressure slide valve no longer uncovers the small ports, and the low pressure cylinder receives steam only from the high pressure exhaust, thus working compound. The engine is changed from simple to compound and vice versa merely by the motion of the reverse lever, the auxiliary ports in the low pressure valve face being uncovered when running full stroke, but rendered inoperative when the valve motion is hooked up beyond a certain point.

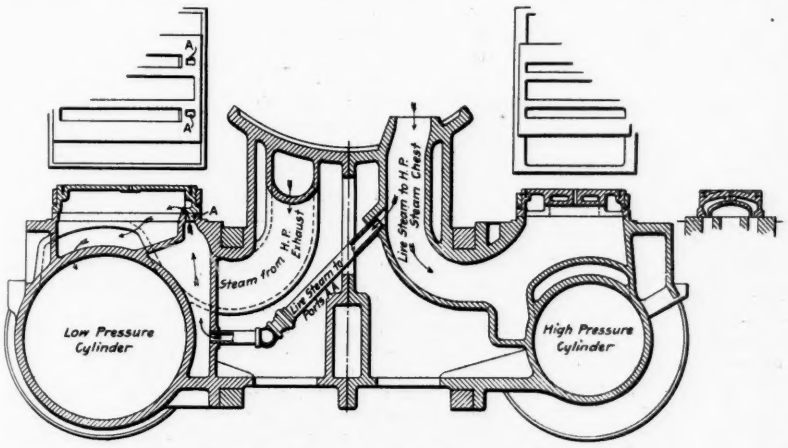


Fig. 3.—Gölsdorf Compound of the Pennsylvania Railroad.

As regards the ratio of cylinder volumes, Herr Gölsdorf considers that the ratios 1 to 2 and 1 to 2.1 ordinarily employed for two-cylinder compounds do not secure the maximum economy possible with his type of engine, and that it does not divide the work equally between the two sides of the engine to employ so small a relation. As the result of experience and careful tests, he has found that two-cylinder compounds give the best results when the cylinders have the ratio 1 to 2.3 or 1 to 2.4; and if a valve gear is used that will give a steam distribution such that the admission on the low pressure side is about 10 per cent. higher, (or cut off occurs 10 per cent. later), than on the high pressure. For his four-cylinder compounds, as well as for those of the Mallet and De Glehn, Gölsdorf prefers to make the cylinder ratio 1 to 3 to secure the greatest economy. Concerning four-cylinder compounds, it may be said that Gölsdorf again has the advantage over some others in not requiring any intercepting valve, for if the crank of one of the high pressure cylinders is in a certain position, it may be necessary, in order to start the train, to admit live steam to the low pressure cylinders, in which case the position of the reverse lever determines the admission in the simplest possible manner.

Indicator cards obtained from high speed compound locomotives generally show very high compression in the high pressure cylinder. In order to diminish this, Gölsdorf makes the high pressure valve with an interior passage or port, thus relieving the exhaust side of the piston sooner than would otherwise be the case. This premature exhaust does not occasion any loss of power, for the steam passes into the low pressure cylinder, where it is utilized. This interior passage is preferable to a very large inside lap of the valve, because it allows only an insignificant quantity of steam to pass into the exhaust, and it postpones also the beginning of compression to almost the end of the stroke.

Almost any design of valve gear that gives satisfactory results with simple engines can be used on the Gölsdorf compounds, and there are now on the latter, in various countries of Europe, the Walschaert, Allen, Joy and Stephenson gears.

The small auxiliary ports in the low pressure valve face necessitate a long travel of the valve, and a later cut-off is required in the low than in the high pressure cylinder. For the high pressure side, the valves are usually set to give a maximum admission of 90 per cent. The long valve travel is not at all objectionable, as it is greatest only at starting; while at ordinary speeds, with a short cut-off, the valve has the same travel as that of a simple engine.

Two curves (Fig. 4) calculated from indicator diagrams, show the tractive effort of a simple and of a compound locomotive for each point of cut-off. From this it appears that the simple engine attains its maximum tractive power at 70 per cent. cut-off, while the compound requires 90 per cent. cut-off to develop the same power. The auxiliary steam pipe used in the Gölsdorf compounds and shown in the accompanying figures has been sometimes regarded as a bad place for draining out in case the engine is standing for some hours exposed to great cold; but if the throttle valve is steam tight, there is very slight danger of freezing up. Of course, when running compound, the small pipe leading to the auxiliary ports is full of steam, but there can hardly be much condensation from this because the pipe is wholly within the smoke-box and protected from radiating its heat. Even if there were a little water in the pipe, it would be gradually drawn out by the vacuum produced in the cylinder when running with the throttle closed, the valve gear then being at full stroke and the auxiliary ports uncovered.

Finally, it is claimed for the Gölsdorf compounds that in case of damage or breakdown on the road, the trip can be finished with one cylinder. If, for example, it becomes necessary to disconnect or take down the high pressure side of the engine, the high pressure slide valve can be moved to a position where it closes both steam ports, after disconnecting the valve stem and rocker. Then by running without hooking back the reverse lever, the low pressure cylinder will take live steam and move the engine. On the other hand, if the low pressure side is disabled, disconnect and move the low pressure valve as far as possible so as to uncover the exhaust port, and come in with the high pressure side. The dimensions and weight of two Gölsdorf compounds built very recently are given herewith.

Locomotives for Austrian State Railroads.

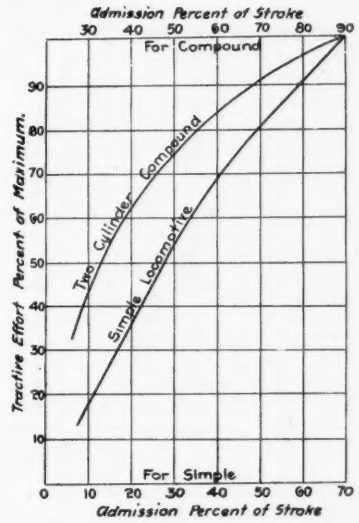
	"Atlantic" type. Four cyl. comp.	Eight-wheel type. Two cyl. comp.
Gage, in.	56½	56½
High-press. cyl., diam., in.	13¾	19⅝
Low-press. cyl. diam., in.	23⅝	29⅛
Stroke of cylinders, in.	26¾	26¾
Drivers, diameter, in.	84¼	83½
Boiler pressure, lbs.	220.5	190
Grate surface, sq. ft.	38	31.2
Fire-box htg. surface, sq. ft.	178.7	118.4
Tube htg. surface, sq. ft.	2,270.3	1,555.5
Total htg. surface, sq. ft.	2,449	1,673.9
Weight on drivers, lbs.	65,250	65,250
Tot. wgt. in w'k'g order, lbs.	153,675	126,000

The Injury to the Cables of the New East River Bridge.

BY ISAAC HARBY, *Assistant Engineer to the Contractors.*

The cables of the new East River Bridge were within a few days of completion, and almost ready to be turned over to the City of New York by the contractors, Messrs. John A. Roebling's Sons Co., when a fire occurred on the top of the Manhattan tower, entirely destroying the footbridges and slightly damaging the cables themselves. The footbridge was a temporary structure, suspended upon 16 wire ropes. Each rope was 2¼ in. in diameter and possessed a tensile strength of 208 tons.

The main cables are four in number, each being made up of 7,696 No. 6 steel wires laid straight. For reasons of convenience during construction, and also for securing the ends to the anchorage, each cable was divided into 37 strands, and the two ends of each strand were formed into a loop which passed around a cast-steel shoe, secured to the anchor chain. The wires of the 37 strands were all finally bunched into one cylindrical cable, squeezed to the smallest possible diameter (about 19 in.) and held together every 20 ft. by steel bands.



Tractive effort, simple locomotive = $.86 \frac{d^2 l}{D}$ P.

Tractive effort, two-cylinder compound = $.65 \frac{d^2 l}{D}$ P.

Cylinder ratio = 1 :2.2 to 1 :2.3.
Pressure in receiver = .4 of boiler pressure.

Fig. 4.—Tractive Efforts of Simple and Compound Locomotives up to Speeds of 15.6 Miles per Hour.

On the towers, 332 ft. above mean high water the cables pass over cast-steel saddles. These saddles are mounted on a roller bed, which permits a motion of 3 ft. in the direction of the longitudinal axis of the cables. During the construction of the cables these saddles are held back 3 ft. toward the land by wooden blocking and small wire ropes.

At the time of the fire of Nov. 11, the contractors were engaged in wrapping the cables with canvas, saturated with a waterproof compound which required to be applied hot. For this purpose it was necessary to have fire on the footbridge and on the towers. The top of each tower was temporarily covered with a great mass of heavy timber work, flooring and scaffolding. The wires while being spun were heavily coated with a petroleum oil as a protection against oxidation, and the cables were painted with this oily material before being wrapped. As a result, the towers and footbridge were well covered with this inflammable material. The final covering of the cable is a sheet of steel in sections 20

*For references see *Railroad Gazette* June 1, 1894, p. 383; June 22, 1894, p. 435; Aug. 31, 1894, p. 580; April 9, 1897, p. 256; Sept. 9, 1898, p. 649; May 12, 1899, p. 339.

ft. long and encircling the cable in halves. At the time of the fire most of this covering was in place.

The burning of the oily timber work caused a hot fire which soon made the footbridge cables red-hot. It burned away the wooden blocking which held the saddles in place, and allowed them to move suddenly toward the river. This lowered the cable in the main span until it rested upon the footbridge, and threw an excessive load upon the red-hot footbridge cables, which parted over the tower and allowed the footbridge itself to go down.

The actual damage which the main cables have sustained is much less than was at first supposed. The fact that the fire was confined principally to the south end of the tower seems to have saved the two northerly cables from any injury whatever. That leaves in question the amount of damage which the two southerly cables have sustained.

A commission has been appointed by the Commissioner of Bridges of the City of New York to determine this fact, and to suggest what is best in the way of repairs. The commission consists of Messrs. Geo. S. Morison, L. L. Buck and Charles C. Schneider. These gentlemen are now engaged in making a thorough examination, and until their report is submitted it would be unwise to attempt to estimate the exact extent of the injury. A few facts, however, should suffice to allay any grave fears that the damage to the two southerly cables is serious or irreparable.

In the first place, the wires in the cable are so compactly bound together, as to be almost equal to a solid cylinder of steel 19 in. in diameter. It would take an intense heat of long duration to penetrate very far into this mass. It takes a heat of about 900 deg. F. to anneal the wire of which the cable is composed. The strength of the wire is reduced about 50 per cent. by annealing. It is not reasonable to assume that, under the circumstances, the wires became subjected to a heat greater than 900 deg. F., or that this heat could have penetrated the cable deeper than one or two layers of wire. There are about 310 wires in the outer layer and about 308 wires in the second layer. Grant that these 618 wires may have been annealed and reduced in strength by one-half. They are then equal in strength to 309 wires and represent a loss of 309 wires out of 7,696, or about 4 per cent. The specifications under which the contract was executed require a tensile strength in the wire of 200,000 lbs. per sq. in. The tests of the wire showed an average strength of about 216,000 lbs. per sq. in., or a gain of 8 per cent. over the required strength. The specifications require a wire splice which shall be 95 per cent. of the strength of the wire. The contractors have devised for this work a special splice consisting of a sleeve-nut which has developed an average strength of 97½ per cent. of the strength of the wire; thus the splices being about 2½ per cent. stronger than required.

The cables are therefore 10½ per cent. stronger than the contract requires, and if we grant that the fire has caused them to lose 4 per cent. in strength, there still remains 6½ per cent. over the contract requirements.

The fire did not affect the cables more than a few feet on each side of the tower, so that in case it is found advisable to replace a few wires which have been damaged, it would be an undertaking of but small magnitude to cut out and splice in pieces where necessary.—*The Polytechnic.*

[Since the above was written the special commission has made its report, which appears below.—Editor.]

The Cables of the New East River Bridge.

Shortly after the fire on the top of the New York tower of the new East River bridge (Bridge No. 2), a commission was appointed to report on the condition in which the fire left the cables. This commission was made up of Messrs. George S. Morison, C. C. Schneider and L. L. Buck. On Monday of this week the commission handed in its report, the essential parts of which are given below.

In the present condition of the bridge 200 wires of cable A over the saddle may be considered injured and these wires worthless in their present slack condition. They are, however, all on top of the cables and can be restored to 90 per cent. of their strength by splicing. The injury to this cable therefore is equivalent to the destruction of 20 wires.

Cable B—500 wires of this cable are injured; 250 of these are on top and can be spliced with a loss of but 10 per cent. of their original strength. The other 250 wires are damaged as follows: 100 wires of the lower layer injured 60 per cent., equivalent to 60 wires destroyed; 100 wires in the second layer damaged 48 per cent., equivalent to 48 wires destroyed; 50 wires in the third layer injured 26 per cent., equivalent to 13 wires destroyed.

The equivalent number of wires in the A and B cables damaged is shown by the following table:

	Before fire.		After fire.		After repairing.	
Cable.	Wires.	P. c.	Wires.	P. c.	Wires.	P. c.
A.....	7,696	100	7,496	97.43	7,676	99.74
B.....	7,696	100	7,196	93.53	7,537	97.95

From this table it may be seen that after being repaired cable A will be damaged but one-fourth of 1 per cent., while cable B will be but 2 per cent. injured. As the cables were originally from 8 to 10 per cent. stronger than the specifications required, cable B even in its present injured condition, before repairing, is stronger than required in the specifications. On the other hand the injury to the cables has occurred in a part of the cables where the strains are greatest. With this form of wire cable construction the section of the cables is everywhere uniform and its size is determined by the strains where the inclination is greatest, that is, immediately adjoining the saddles. If eye-bar chains were used, permitting of variations of the sections, the dimensions of the chains would be about 9 per cent. larger here than at the center. In every structure some margin is expected above the minimum required by the specifications, and when an injury of this kind has occurred it is desirable to restore the structure to the strength which it had before the injury. To do this 20 wires must be added to cable A and 159 to cable B, in addition to the repairs above outlined.

These additional wires must be added to the cable where it passes over the saddle. The method of making this attachment which commends itself most to us is to place a series of bands, each made in two parts, around the cable and clamped to it by steel bolts; the upper half of each band should have a series of holes through which the reinforcing wires would pass, being held and adjusted to strain by nuts at the ends. These nuts should be somewhat similar in character to the coupling used to connect the cable wires.

It is not considered feasible to attach more than 20 wires to one band, while there should be an additional band covering all wires. This would involve three bands on each side of the saddle on cable A and 11 such on cable B. The bands should be placed about 1 in. apart, so that each band might act independently of the others in securing its own grip. Repairs of the cables then will consist of three separate operations:

1. Splicing of the wires on top of each cable.
2. Tightening of the injured wires on the bottom of each cable.
3. Addition of new wires.

The first two of these operations should be performed as speedily as possible and the addition of the wires should be put on immediately thereafter, but the final tightening of the bands and the wire wrappings should be deferred until the cables are carrying their full load.

The American Pacific Cable.

The first section of the American Pacific cable was completed on Jan. 1 and messages were sent from Honolulu to President Roosevelt and others. This section is 2,300 miles long, the American end being at San Francisco. Considerable difficulty was experienced in laying the shore end on this side, but on Dec. 12 it was finally connected to the land end. The land cable is well made and contains four conductors insulated with gutta percha, lead sheathed, and heavily armored and is 6½ miles long. These sections of the cable were made by the Okonite Company, of New York, and the deep sea portion by the India Rubber Gutta Percha and Telegraph Works Company of England.

The cable was laid by the "Silvertown," an English boat, at an average speed of 7½ knots an hour. In starting the work the cable boat approached as closely as possible to the shore and the shore end of the cable was floated in by large air bags on a rising tide. The cable was then connected up to the shore end and tested, after which the journey was begun. On Dec. 26 the "Silvertown" reached Honolulu, after a stormy passage.

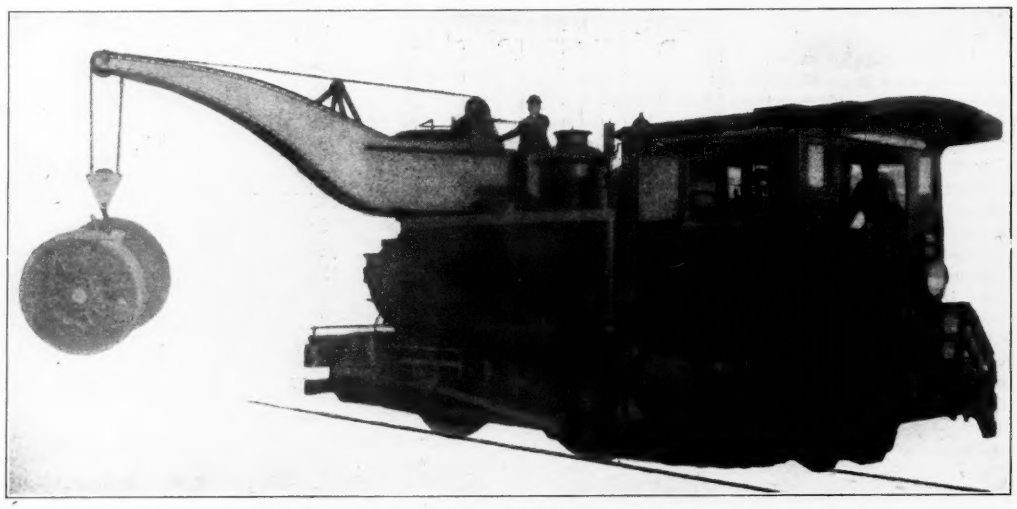
The "Silvertown" will soon commence laying the second section; from Honolulu to Midway Island, a distance of 1,300 miles. The third section will extend from Midway Island to Guam and the last section will be to Manila. The company expects to have the entire work completed by July 4, 1903.

It will be remembered that the late John W. Mackay was the initial spirit in the formation of the Commercial Pacific Cable Company, and it is a source of great regret that he did not live to see the completion of this great enterprise. At his death his son, Mr. C. H. Mackay, took up the work, and in conjunction with Mr. G. G. Ward, Vice-President, and others, carried the work to its completion. It is a rather peculiar coincident that almost simultaneously with the completion of this first section, it is reported that successful wireless communication has been established across the Atlantic.

A Combined Switch Engine and Crane.

A novel combination of crane and switch engine in use in the Topeka shop yards of the Atchison, Topeka & Santa Fe is shown in the accompanying engraving. The locomotive, which is a four-wheel tank switcher, has been equipped for oil burning, the storage drums for the fuel being under the cab on each side.

The crane is mounted upon a hollow post, which also forms the stack for the locomotive, and revolves about this post on ball bearings. The crane is run by an air motor supplied from the air pump of the engine. The position of the crane operator is shown in the engraving.



Combined Switch Engine and Crane—Topeka Shops.

The capacity is 8,000 lbs., and the usefulness of such a combination around the yards of railroad shops is at once apparent.

Mr. G. R. Henderson, Superintendent of Motive Power, sent us the photograph from which our engraving is made.

The British Westinghouse Works at Trafford Park, Manchester.*

The buildings are of steel work bricked in; steel columns set on concrete foundations, and tied with cross girders, support the steel roof spans; the nine buildings, with the exception of the office building, which faces the entrance gates, all run in parallel rows almost due north and south. The various industries are accommodated in independent buildings, and the various branches of work are each carried out in some definite portion of the main building. All these buildings and departments are linked together by a complete network of standard gage permanent railroad lines, about 10 miles long.

The Iron Foundry.—This self-contained foundry is on the extreme east of the works, and is 600 ft. long and 180 ft. wide. The foundry at present contains two cupolas, one having a capacity of about 18 tons; running along the side is the charging platform, which communicates with a sort of covered platform, railed in, forming a new kind of storage. This store, a unique feature, is built entirely of iron outside the foundry, and has a plate-floor on a level with the charging platform, with railroad-truck service below, and a hydraulic lift for raising the metal pigs or scrap direct to the store and charging floor. The wide, center bay of the foundry is spanned by 50 ton electric traveling-cranes. The crab contains two sets of hoisting-gear, each driven by its own motor, one for weights up to 50 tons, and the other for light loads of 10 tons and under. The pillars are, also, to be provided with swinging jib-cranes.

The lighting of the iron foundry is very striking; it is obtained by means of a large number of the new type of arc lamp known as the "Westinghouse Bremer Light." This lamp, only recently introduced by the British Westinghouse Company, differs entirely from other arc lamps. The bright, golden light emanates from a sphere and not from a very vivid point, so that there are no shadows cast on the globe of the lamp; the result is particularly pleasing. The makers claim for it the additional advantage that its light only costs the third of that of an ordinary arc; therefore, the firm is using it in preference to any other for their works at Trafford Park; they are placed on brackets from the main steel pillars. These, and thousands of incandescent lights, mainly suspended by long lengths of flex from the ceilings to within about 6 ft. of the floors, are in general use throughout the machine shop, the pattern shop, the stores, offices, etc.

A standard gage railroad line enters the iron foundry at each end; the facilities for the transfer and shipment

*Abstract of an article by Mr. D. N. Dunlop in the *Imperial Argus*, Nov., 1902.

of the large castings turned out are, therefore, of the best, the cranes lifting them and depositing them into the railroad cars which carry them into the next shop.

The Brass and Malleable Iron Foundry.—Adjacent to the iron foundry and parallel with it is the brass and malleable iron foundry, a building divided transversely into three distinct parts. At the northern end is the brass foundry, 170 ft. long by 75 ft. wide, and having a large gallery about 25 ft. wide, running completely around it, 30 ft. above the floor. There are at present several furnaces in regular use in this department, the work being the production of smaller details, such as brush-holders, collecting-gear, terminals, etc., for dynamos, parts of arc lamps, instruments, switches; in fact, all the cast brass and copper work.

A brick wall, fitted with automatic fire-doors, separates the brass foundry from the center portion of the building, which is used as a store for special foundry materials. This part of the building is two stories high, the second being approached by staircases and lifts; the upper floor is divided into small departments, such as chemical and special research laboratories; and a printing department, thoroughly-up-to-date, where the innumerable forms, sheets, and publications required by this large establishment are printed; the whole plant is electrically driven.

Steel Foundry and the Forge Shop.—These are under one roof, but divided by a brick wall 12 ft. high, having an opening in the center 18 ft. wide to allow through railroad and crane communication. In the steel foundry there are two 20-ton Wellman's patent tilting open-hearth furnaces, operated by five Duff gas-producers. The metal for these furnaces is hauled by electric power up an inclined approach from the outside track to the charging platform, seized by an electric charging machine, and run direct into the furnace. The rolling or tilting of the furnaces is produced by means of electric motors considerably geared down. The 20 tons of molten steel poured from each furnace is conveyed by means of 50-ton electric cranes to any part of the building. The forges are at the northern end of the building.

The Wood-working Shops and Pattern Department are also in full operation.

Machine Shop.—The machine shop is almost 1,000 ft. long and 450 ft. wide, so that the area is approximately 10 acres; it is divided into five longitudinal bays, or aisles, all of which are lettered. Three of these are two-stories high. There is also an intermediate gallery, or mezzanine floor, in the three two-story bays devoted to lavatories, clothes-lockers, and general conveniences for the use of the workmen. There are about 600 wash-basins in this shop alone.

The galleries above the mezzanine are devoted to smaller detail working where girls prepare insulating materials, wind small coils, and perform other light work.

The roof is striking on account of its light construction and transparency. It is almost entirely of glass, which has embedded in it meshes of wire-netting, cast in during the process of manufacture; owing to this device, even if a pane be fractured, no pieces or splinters will fall. The wired glass is so strong that a man can walk on it, but it costs three and one-half times as much as ordinary sky-light glass. The floor consists of a 12-in. concrete foundation, on which are laid asphalt bricks, in order to render it fire-proof. The floors of the gallery are built without joists, being composed of solid rows of boards 2 in. thick and 10 in. deep, placed edgewise, side by side, so that they can be spiked together; on this solid foundation a light flooring is laid; steel girders support the floors.

There are some 1,300 machine tools at work, from the tiny grinders, weighing no more than 5 lbs. each, to the great Sellers boring mill, one of the largest in the world, which can at one operation turn the rim of a fly-wheel 28 ft. in diameter. The mill covers an area 50 ft. by 20 ft., and stands 25 ft. high, and is motor driven. In another aisle is a large bed-plate for very heavy castings, and served by a crane which handles the portable tools. In the southwest corner of the machine shop tramway motors are built.

There are other buildings—the box factory, a pattern-shop, a drying and dipping-shop, the pumping station, and the power-house, where the steam generating plant is thought to be sufficiently powerful for two years, after which extension will be needed. Gas-engines will then be installed to take the place of steam, the present boilers serving for heating purposes. From the power-house a system of tunnels a mile long connects all the buildings, carrying pipes and electric wires; they are constructed of concrete, and are 6 ft. high by 5 ft. wide.

The Office Building.—The office is a handsome six-story building, which makes an imposing and dignified frontage to the entrance-gates. The total floor space is 75,000 sq. ft. The fine white marble hall leads to a staircase fitted with polished white marble-paneled walls and ceilings; the doors, window frames, cabinets, and furniture, uniformly of rich dark oak, form a pleasing contrast. The rooms are handsomely fitted with mosaic floors, and oak-paneling, and a novel feature is the combined wardrobe and lavatory cabinet in each office. One end of the building is absolutely fireproof, and is divided into strong rooms, wherein are stored the works records, designs and all other valuables. On the various floors are the offices of the chiefs of departments, draughtsmen, accountants, shipping and general clerical staff. A portion of one of the upper floors is set apart as a dining room for the works' staff; it is handsomely furnished in solid mahogany. The kitchen adjoining is thoroughly up-to-date, and its equipment is complete and modern.

The heating apparatus is worthy of notice. An automatic regulated hot-water system is installed with radiators in each room.

A complete system of record and cost-keeping, by means of the card system, has been instituted at Trafford Park, and the same system has been extended to the drawing, photo, and other departments. Accounts are kept by means of cards, and the correspondence is filed according to the same practical and efficient system.

Labor.—Land in front of the works has been laid out as sports ground, where four or five teams play every dinner-hour, and thus get healthy occupation and exercise, instead of loafing about outside public-houses, as in towns—there is, by the way, no public-house as yet on the Trafford Park estate, nor within one and a-half miles of the works.

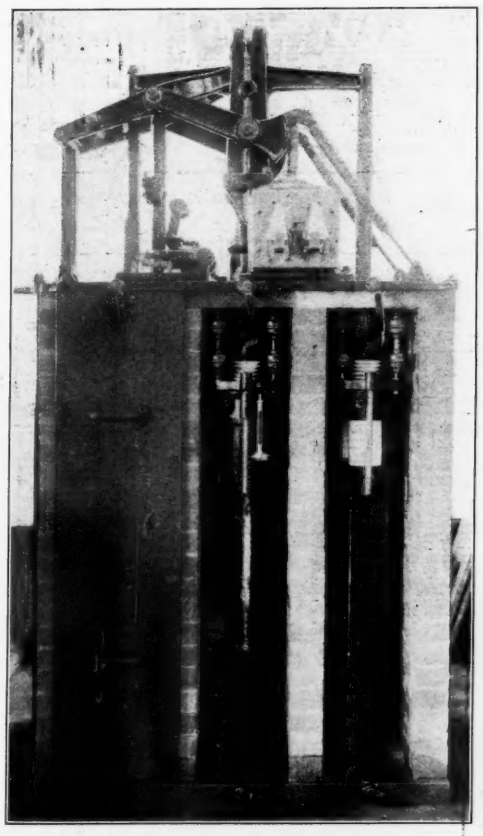
The Trafford Park Dwellings Company, Limited, purchased 79 acres of land in a central situation immediately adjoining the site of the British Westinghouse Company. The houses, which are substantially built, are fitted with hot and cold water, baths, and electric light.

There will eventually be 2,000 cottages, at rents varying from $1.44 to $2.00 per week. A little town is springing up. A first-class hotel for the accommodation of business men has been erected and will be opened at the end of this year. A public library and baths are to be erected shortly, and it is intended to supply the estate with fuel-gas for cooking and heating purposes.

The General Manager of the works is Mr. H. S. Loud, and Mr. W. C. Mitchell is Superintendent.

An Electrically-Operated Oil Circuit-Breaker for High Tension Circuits.

It is to meet the need of a compact, safe and reliable device for rupturing high-tension circuits that the oil-break circuit-breaker has been developed. The accompanying illustration shows a three-pole, double-break, automatic oil circuit-breaker, operated by electro-magnets. The circuit-breaker is erected in a masonry structure with each pole and oil tank in a separate, fire-proof compartment. There are two stationary contacts to the pole, one connected to the incoming lead and the other to the outgoing lead of the same phase, each contact being mounted in a large porcelain insulator. In the illustration, one of the porcelain insulators is visible in the right-hand compartment.



Electrically Operated Circuit-Breaker.

The insulators are fastened to a cast-iron frame which also supports the enclosing oil tank. The frame itself is supported from the soapstone slab at the top of the masonry walls by strain insulators. The movable contact for each pole consists of a U-shaped piece of copper fastened to the end of a stout wooden rod. In the closed position of the switch one of these U-shaped pieces electrically connects the two stationary contracts of each pole. The wooden rods are fastened at their upper ends to a common cross bar, which extends over the three masonry compartments and is supported by a system of levers giving a straight-line up-and-down motion. The cross bar is raised by the enclosing magnets, assisted at the beginning of the motion by a pair of balancing springs. The springs and the case containing the magnet are at the upper right-hand corner in the illustration. A toggle joint, shown at the left, automatically locks this system of levers when the circuit-breaker is in the closed position.

The toggle joint is released by a blow from the tripping magnet, whereupon the cross bar under the influence of gravity, and a powerful spring quickly drops, opening the contacts. The break takes place first at the main contacts and then afterward at a removable plug attached to the stationary contact which enters a hole on the movable contact. The plug thus receives all the effects of any arcing. If necessary, the circuit-breaker can easily be operated by hand without disturbing the mechanism in any way. The oil tanks, one of which is to be seen in the middle compartment, are constructed of heavy sheet metal and the interior is lined with insulating cement which is moulded to fit closely about the terminals and moving contact piece, leaving just room enough for the free movement of the parts in oil. By this means the amount of oil is reduced to a minimum. When the circuit-breaker is open, the wooden rod interposes an effective barrier between the two terminals of each pole. Suitable levers are provided for handling the tanks, which may be lowered away from the contacts and removed without disturbing the rest of the circuit-breaker.

The controlling and indicating devices consist of a controlling switch, an electro-mechanical tell-tale indicator, and a lamp. If the oil circuit-breaker opens through the action of any of the automatic devices a lamp will be lighted on the operating stand to attract the operator's attention. If the oil circuit-breaker is opened by the operator throwing the controlling switch to the "open" position, the lamp does not light.

In the accompanying illustration the closing magnet is partly hidden by the overload relay. This operates on the principle of the single-phase induction motor. Each of the sectors swings between the poles of an alternating-current electro-magnet. Part of each pole is surrounded by a short circuited strip of copper, which acts to retard the magnetic flux and thus produce a shifting field. This tends to move the counter-weighted sectors which carry a contact closing the tripping circuit of the circuit-breaker. The two sectors are connected in parallel and either will trip the breaker.

The apparatus is known as the "Type C Circuit-Breaker," and is made by the Westinghouse Electric & Mfg. Co.

The New York Terminal of the Pennsylvania Railroad.

Last week on the editorial page we published the particulars, as near as we could get at them, of the contract made by Messrs. Westinghouse, Church, Kerr & Co. for a considerable part of the design and equipment of the Pennsylvania tunnels and station in New York. We now have an official statement, a considerable part of which is printed below.

A double tunnel will extend from the west side of the Bergen Hill in New Jersey to the New York terminal at 32nd street. The New York terminal structures will occupy the site bounded by 31st and 33rd streets, Seventh and Ninth avenues, with 32nd street closed for 1,600 ft. between these two avenues. Four tunnels will connect this terminal with the Long Island terminal at Long Island City, where the terminal facilities proper will be located, with accompanying yards. A modification will be made in the Long Island Railroad, involving the change on certain portions of the western division from steam to electric traction. Power houses will be built aggregating upwards of 100,000 h.p., one on Long Island and the other in New Jersey.

It is apparent that the management conceived of a method which is almost original in its simplicity, yet peculiarly effective in its scope and method. They evidently conceived of this work as composed of four main functions; the tunnels, the architecture, the mechanical and electrical engineering, and the bringing of the railroad into and through them. They therefore created a commission of engineers to design and supervise the construction of the tunnels; appointed architects for the structures and engineers for the mechanical and electrical equipment; while the Chief Engineer's Department brings the road into the property thus created. The conduct of the entire enterprise is established on the most harmonious and effective lines, at the same time relieving the operating departments of the road of detail which might swamp the best organization based on any less comprehensive plan.

The commission to design and produce the tunnels consists of Col. Charles W. Raymond, Corps of Engineers, U. S. A., Chairman; Charles M. Jacobs, Chief Engineer North River Section: Alfred Noble, Chief Engineer East River Section; William H. Brown, Chief Engineer Pennsylvania Railroad, in charge of tracks and terminal yards; Gustav Lindenthal, Bridge Commissioner of New York city; George Gibbs, First Vice-President of Westinghouse, Church, Kerr & Company, in charge of mechanical engineering, electric locomotives and traction. The architectural work has been delegated to Messrs. McKim, Mead & White.

Messrs. Westinghouse, Church, Kerr & Company have been appointed the mechanical and electrical engineers and constructors of the extensive and varied work which follows through many departments of the undertaking. Their organization, already developed on other large work, automatically, departments this work along the regular

lines in which their engineering and construction operations are regularly conducted. Following upon this appointment, the architects made Messrs. Westinghouse, Church, Kerr & Company their engineers for this work, giving a self-contained relationship between these divisions. These three organizations working with the Chief Engineer and management of the road will produce this work expeditiously and in the highest state of all of the arts represented. Paralleling this arrangement, Westinghouse, Church, Kerr & Company have been appointed in a similar capacity by the Long Island Railroad in the electrification of its Atlantic Avenue Line, which will be served with power from the Long Island power house erected in the joint interest of the properties represented.

The task of administration on the part of the Pennsylvania Railroad Company is simplified in having but three bodies with which to deal, the Commission, the Architects and the Engineers, upon whom is placed the responsibility and labor of the execution of the work.

The Commission has been at work since early last spring, while the architects and engineers have had a corps actively engaged since about June last. The engineers have substantially completed the plans for the Long Island power house, so that work can be begun immediately. This has become necessary in order to provide electric power for the Atlantic Avenue Division of the Long Island Railroad, which will be completed for operation in advance of the tunnel construction. This power house, together with the one in New Jersey, will jointly serve the entire traction system, and each will have provisions for relaying the other and for serving the New York Terminal singly or jointly.

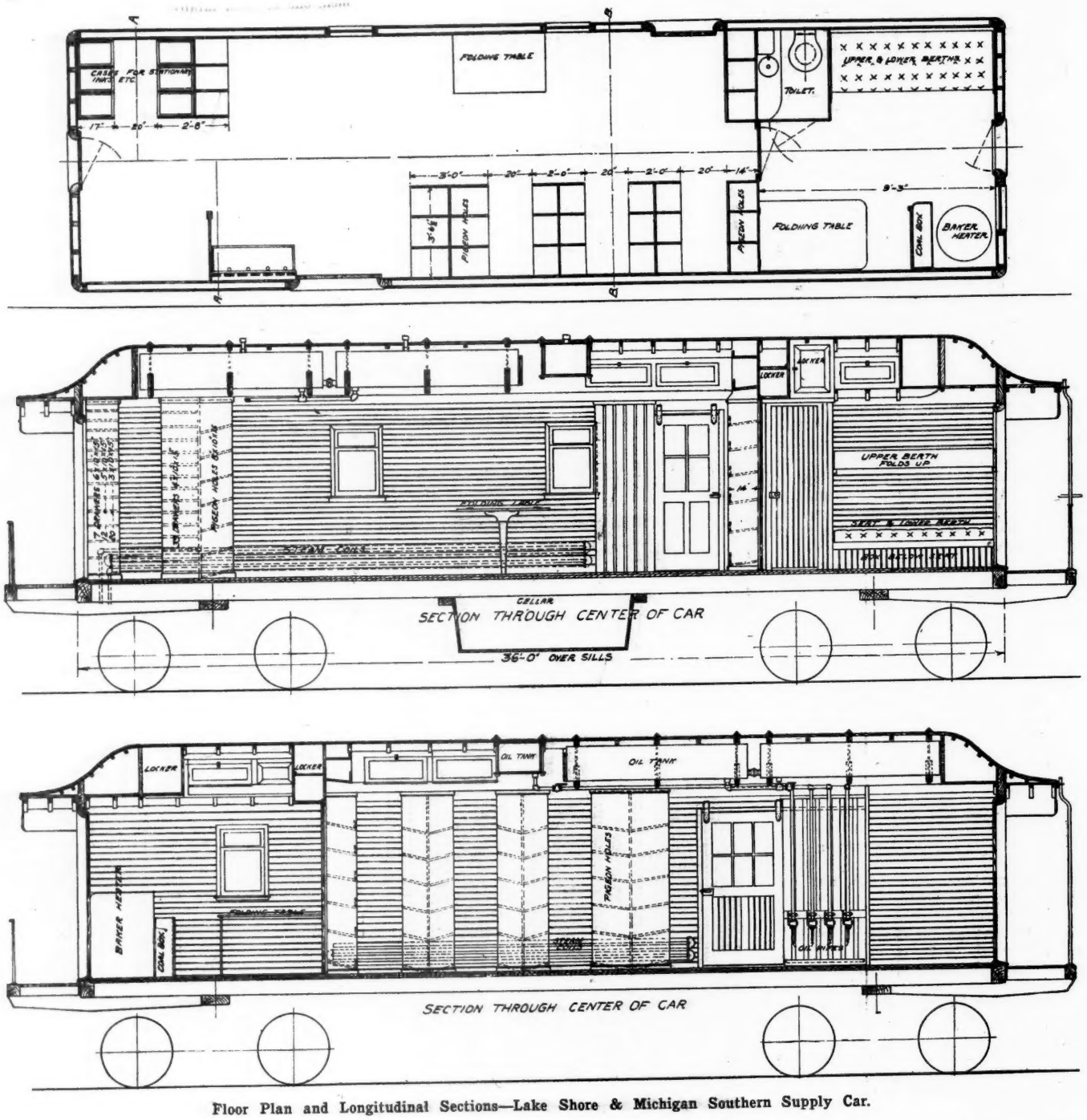
To the public the buildings in New York and their contents will form the visible terminal, but the engineering and general railroad functions, more important from the standpoint of cost and complexity, will be appreciated only by the few who are technically interested. This New York Terminal will contain much of interest to engineers

The Railroad Supply Car.

A paper on this subject was presented to the January meeting of the Western Railway Club by Mr. J. P. Murphy, General Storekeeper of the Lake Shore & Michigan Southern, at Collinwood, Ohio. Referring to such a car as a portable storehouse, it was said that experience in distributing supplies tends to advocate the use of a specially equipped car for such distribution over lines at points where a regular stock of material is not kept. As it is claimed that supplies constitute 50 per cent. of the operating expenses of a railroad, it is necessary that the strictest economy be exercised in handling and distributing them. It is contended that the supply car will largely eliminate losses in transit through improper packing for shipment; losses through carelessness and improvidence of employees; and losses by packages going astray. It saves way-billing and rechecking, and transferring at junction points. Furthermore, there will be more space available in the storehouses for handling other material and in the freight houses for revenue freight. Other commendable features are, promptness and regularity in distribution; education of the consumers to the fact that the material has an owner; and the fact that it enables the man in charge of the supplies to visit periodically the most remote points on the line.

The feature of prompt delivery will obviate a difficulty not uncommon where a supply car is not used. This is the accumulation of a stock of more or less obsolete material. Lack of prompt attention to his requisitions has probably caused the consumer inconvenience and to prevent a recurrence of this he orders on subsequent requisitions larger quantities than are actually necessary. Frequently requisitions are cut down by the higher officer causing resentment on the part of the subordinate filing them. If a supply man visits such points, by calling for the worn-out material he can check the consumption and judge of the fairness of the requisitions.

Knowing that the supply car will call upon a certain



Floor Plan and Longitudinal Sections—Lake Shore & Michigan Southern Supply Car.

The Commission at regular intervals, following upon the departmented work of its individual members, which meetings are attended by Mr. Mead, the representative of the architects, while Westinghouse, Church, Kerr & Company are represented on the Commission by their First Vice-President.

Within the Westinghouse, Church, Kerr & Company organization has been formed a special Pennsylvania Railroad Terminal Committee meeting at regular intervals and representing in its membership the various branches of engineering involved, whose proceedings constitute a continuous and systematic record of engineering development, design, decision and progressive work based upon the operations of the several departments whose heads are members of this special committee.

Thus far the active engineering work has consisted chiefly of investigations concerning methods, quantities and feasibility of numerous plans—the Commission, the architects and the engineers working independently upon their segregated duties. Thus there is being perfected a set of plans which will come before the management of the Pennsylvania Railroad for final approval.

in the mechanical and electrical equipment, comprising heating, ventilation, lighting, passenger, freight and baggage elevator service, telegraph, telephone and pneumatic tube service, refrigeration, hot water, cooled water for drinking, fire protection and other features serving a structure which will be almost a city in itself.

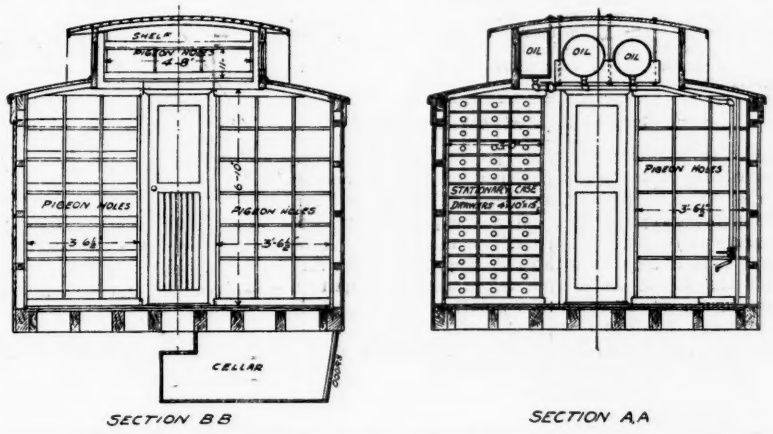
A part of, yet quite distinct from the buildings, will be the terminal proper, of which a general idea may be gained by the fact that the area of some 1,800 by 500 ft. between Ninth and Seventh avenues will need be excavated to a depth of some 40 or 50 ft., and on foundations therein will rise what corresponds to a trainshed in other terminals, with tracks, cross overs, platforms, waiting rooms, ticket offices and other paraphernalia of a great station, together with the switch and signal system.

Chicago papers say that on the Chicago, Burlington & Quincy every trip pass must hereafter be approved by one of four men: two in the General Superintendent's office, one in the General Manager's and one in the office of the General Counsel.

day causes employees to depend upon it, put all of their wants upon their monthly requisitions and save many emergency calls by wire, which necessitate passenger train shipments.

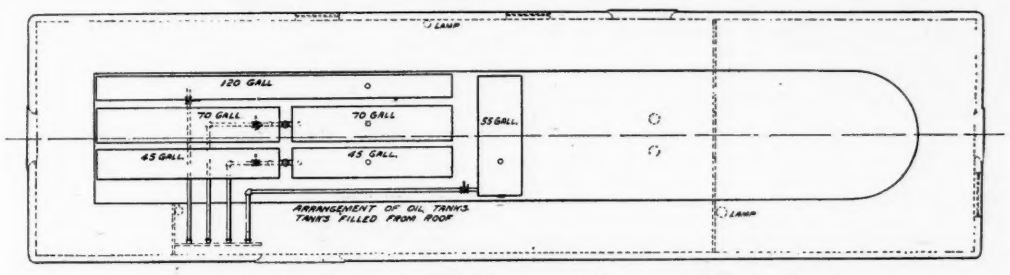
Illustrations are shown of a supply car in use on the Lake Shore. The car is provided with oil tanks located in the roof, pipes leading to the doorway; shelves for stationery, end pockets for globes and other miscellaneous material. It is also provided with a Baker heater, and with straight piping for air and steam heat, enabling it to be placed in local passenger trains. There is also a cellar which will accommodate several bundles of brooms and other light bulky material; also a small oil stove which the supply man uses for cooking. Sleeping accommodations for two men are provided. For the distribution of heavy material such as frogs, switch points, guard rails, rail braces, tie shims, etc., an auxiliary car is attached to the regular supply car, from the point where heavy material may be furnished. As soon as the supplies in these cars are distributed, the latter are released.

It is considered that a man at a salary of $50 per month, or possibly less, can handle this business very nicely after this system is installed. An old box car equipped with temporary shelving and bins can be made to answer the purpose, with the exception of accommodations for oil. This can be handled in an ordinary car if the quantity is not very great or if storehouses can be met with frequently enough to replenish the stock.



Cross Sections—Lake Shore & Michigan Southern Supply Car.

The paper advocates one regularly assigned car, to be in constant commission and equipped for transfer in passenger trains. Should the system have a great many branch lines making it impossible for one car to cover it in 30 days, branches might be cut out from junction points alternately by having the supplies for the branch collected into a package and way-billed by the supply-car attendant, to be transferred by a regular train.



Arrangement of Oil Tanks—Lake Shore & Michigan Southern Supply Car.

The supply car system is not intended to curtail or abolish requisitions. The latter should be handled in the usual manner to the storehouse. There they may be sorted into station order for the route of the car. After sorting they should be abstracted by the supply-car man (a form of abstract was submitted), which will enable him readily to determine how many of each item is wanted in the territory the car is to transverse.

At the various points at which distribution is made the consumer, upon receiving his supplies, is also handed his requisition to enable him to check them off. Old articles are returned and failure to do so is entered by the supply man in a book carried for the purpose. This is sent to the general storekeeper at the proper time.

It is not expected that the supply car will carry sufficient material for a great mileage. To meet this condition redistributing store-houses should be located at intervals of sufficient frequency to enable the car to be replenished whenever necessary, the supplies being sent to such points direct by the purchasing agent.

The man in charge of the car soon becomes familiar with the needs of the various consumers and this knowledge on his part will cause the consumers to exercise more care in making our requisitions. Furthermore, he can judge if articles returned as worn out are really unfit for further service. Often articles that are consigned to scrap would give considerable additional service if repaired, thereby effecting an important saving.

It is suggested that such a man might be commissioned to examine and report upon the general appearance and neatness of the waiting rooms, freight houses, etc., that he visits.

In conclusion the paper says: The distribution of supplies, no matter how small they may be, should necessitate the return of old articles. It is just as essential that an old lamp burner be returned as it is that a journal bearing be returned; not so much in the value of the old article as the proof in itself that it has not been misappropriated. Many articles furnished employees appear to be of so little value that considering them individually they do not seem to justify the cost of watching over them, of counting and inspecting, of keeping a record of their disbursement and use. Nor are the benefits of such watchfulness at first apparent. It is, however, both necessary and valuable.

It is frequently found that stationery is not properly cared for; blanks become mixed in desks and small cupboards. The supply-car man, while he may not have an opportunity to thoroughly inspect each station, owing to the time in which the work-train crew finish their work, yet will have more or less time at every station after delivering the supplies called for by the parties at that point, and this time can be devoted to checking up, this month stationery, next month section tools, etc., another month the yardmaster's office, etc. The record of movement of the supply car, and work done at each station each month, will readily show to him what inspection, if any, has been made at that station for preceding months.

Summarizing briefly, the supply-car systematizes the distribution of petty supplies. It affords opportunities to collect surplus obsolete material, and check up stations. It curtails requisitions and brings about better care in the use of material. It saves way-billing; saves labor in packing up supplies before leaving the storehouse; avoids delays in transfers; avoids loss through regular freight shipments; relieves passenger shipments; reduces orders by telegraph to a minimum; avoids complaints—a small thing seemingly, but if all the time of officers and employees spent in investigating and running to ground these questions were taken into consideration we would be surprised at the amount of money these investigations cost eventually. Lastly, it insures promptness and regularity.

Train Accidents in the United States in November.[1]

rc, 1st, 1 a.m., Boston & Albany, Worcester, Mass., a freight train ran into the rear of a preceding freight, which had been stopped at the entrance of the yard, and five trainmen were injured.

*rc, 1st, Northern Pacific, Glyndon, Minn., westbound passenger train No. 3, second section, ran into the rear of a preceding freight, wrecking the caboose and three freight cars. The engine was badly damaged. Two trainmen were killed. The wreck took fire and was mostly burnt up. It is said that the men on the freight misunderstood the signals carried or given by the first section of train No. 3.

rc, 1st, Atlantic Coast Line, Elm City, N. C., a passenger train ran into a freight, wrecking the engine, baggage car and several freight cars. The passenger engineman was killed and five trainmen and several passengers were injured.

rc, 2d, New York Central & Hudson River, Schenectady, N. Y., rear collision of freight trains, badly damaging the engine, caboose and three cars. One brakeman was killed and one other trainman was injured.

bc, 2d, Illinois Central, Boaz, Ky., butting collision of freight trains, making a bad wreck. It is said that an operator neglected to deliver an order to one of the trains.

xc, 2d, Illinois Central, Jackson, Miss., a passenger train collided with a switching engine. Nine passengers and four trainmen were injured.

o, 2d, Baltimore & Ohio, Baltimore, Md., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman, fireman and one brakeman were killed.

*rc, 3d, Baltimore & Ohio, Meyersdale, Pa., a freight train running rapidly on a descending grade collided with two empty locomotives ahead of it, wrecking three locomotives and seven cars. The wreck took fire and was mostly burnt up. One engineman and one fireman were killed and another engineman was fatally injured. It appears that the empty engines had been unexpectedly stopped and had sent a flagman back to flag the freight train; but the latter was running very fast.

xc, 4th, Seaboard Air Line, Savannah, Ga., a locomotive collided with some freight cars, injuring three trainmen, one of them fatally.

xc, 4th, Wheeling & Lake Erie, Coshocton, Ohio, a passenger train ran over a misplaced switch and collided with some freight cars standing on a side track. The engineman and fireman were injured probably fatally, and two men at work in the cars on the side track were seriously hurt.

dn, 4th, Perry County Railroad, Landisburg, Pa., a car in a mixed train was derailed as the train approached a bridge, and three freight cars fell off the side of the bridge into Little Juniata Creek. The president of the road, riding in the passenger car, was slightly injured. The car that first left the track appears to have been derailed by the spreading of the rails, due to the excessive weight of the car, which contained over 45 tons of lading, although it was of only 30 tons capacity.

dn, 4th, Erie Road, Cleveland, Ohio, a freight train became uncontrollable on a descending grade and the engine and 12 cars were derailed and wrecked. Three trespassers riding on the train were injured.

dr, 5th, Pennsylvania road, Meadows, N. J., the westbound Black Diamond express of the Lehigh Valley ran through movable frog points and ran against an empty engine standing on a side track. The foremost car of the express train was wrecked, and two other cars fell partly down a bank; 12 passengers and two employees were injured, none of them seriously.

xc, 7th, Illinois Central, Central City, Ky., a freight train switching on the main track was run into by a passenger train and both engines were wrecked. Four trainmen and three passengers were injured.

8th, Cincinnati, Hamilton & Dayton, Indianapolis, Ind., butting collision between a freight train and an empty engine, making a bad wreck. Three employees were killed and nine were injured. The collision is said to have been due to confusion of telegraphic orders.

bc, 8th, Cleveland, Cincinnati, Chicago & St. Louis, Marysville, Ohio, butting collision between a passenger train and a freight, damaging both engines and several cars. A man riding on the front platform of the baggage car was killed.

*bc, 9th, 5 a.m., Norfolk & Western, Barger, W. Va., butting collision between a passenger train and a freight, wrecking the engine, baggage car, mail car and several freight cars. The baggage and mail cars took fire and were burnt up. The express messenger was killed and his body destroyed in the fire, and one engineman and one fireman were injured. There was a dense fog at the time. The passenger train had passed a flagman who had been sent forward from the freight. There was a dense fog, the flag was not seen and the flagman had not put down torpedoes. The passenger train was running very fast.

9th, Norfolk & Western, Bluefield, W. Va., passenger train No. 1 was derailed and the engine was overturned. The engineman and fireman were killed.

xc, 10th, Missouri Pacific, Jefferson City, Mo., a passenger train collided with a switching engine and six passengers were injured.

bc, 13th, Louisville & Nashville, Hendersonville, Ky., butting collision between a passenger train and a freight, wrecking both engines and 12 cars. Two trainmen were injured. It is said that conflicting orders had been given.

bc, 14th, Baltimore & Ohio Southwestern, Green Springs, Ind., butting collision between a passenger train and a freight, damaging both engines. A tramp riding on the baggage car was fatally injured.

bc, 14th, 9 p.m., St. Louis, Iron Mountain & Southern, Mablevale, Ark., passenger train No. 8 was derailed and the engine and baggage car badly damaged. Two passengers were injured.

bc, 15th, Pennsylvania Line, Warsaw, Ind., butting collision of freight engines, wrecking both engines and several cars. One fireman and one engineman were injured, the fireman fatally.

xc, 15th, Chicago, Milwaukee & St. Paul, Rockland, Wis., collision of freight trains, damaging one engine and several cars. One trainman was killed. It is said that one of the trains ran past a stop signal which had been put out against it at Rockland Station.

*rc, 16th, Wheeling & Lake Erie, Fremont, Ohio, a freight train running at high speed on a descending grade ran into the rear of a preceding freight which had been unexpectedly stopped, and the engine, 12 freight cars and one empty passenger car were wrecked. The wreck took fire and was mostly burnt up. One trainman was injured.

rc, 16th, 6 p.m., Pennsylvania Road, Carney, Pa., a westbound passenger train ran into the rear of a preceding empty engine. One employee was injured.

xc, 16th, Pennsylvania Lines, Indianapolis, Ind., collision between passenger train No. 32 and a freight, badly damaging both engines. Three trainmen were injured.

unf, 16th, 1 a.m., New York Central & Hudson River, Karthaus, Pa., freight train No. 48 was derailed by bowlders which had fallen upon the track in the middle of a long tunnel.

rc, 17th, 3 a.m., Pennsylvania road, Bolivar, Pa., a freight train ran into the rear of an empty engine ahead of it and the empty engine was pushed into the rear of a freight train still farther ahead. Both of the engines, with a third engine attached to the rear of the foremost train, were derailed and, with 10 cars, were wrecked. Two trainmen were killed.

xc, 17th, Tallahassee, Fla., a freight train of the Seaboard Air Line ran into an empty engine of the Carrabelle, Tallahassee & Georgia, at the crossing of the two roads, and the boiler of the last named engine exploded. One brakeman was killed and four trainmen were injured.

xc, 17th, 8 p.m., Baltimore & Ohio, Baltimore, Md., collision between a passenger train and a switching engine, the latter being on the main track contrary to rules. The fireman of the passenger train was killed and two other trainmen were injured.

unx, 17th, 5 a.m., Texas & Pacific, Terrell, Texas, pas-

[1]Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

senger train No. 3 was derailed and the first three cars were wrecked. Four passengers and one trainman were injured.

†xc, 18th, New York, New Haven & Hartford, Madison, Conn., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking five cars. A man in one of the cars in charge of a horse was killed, and one trainman was injured.

unf, 18th, Southern Pacific, Devers, Texas, passenger train No. 10 was derailed at a misplaced switch and the locomotive was overturned. The first two cars were wrecked. The engineman, fireman and one passenger were injured, the engineman fatally. It is said that the switch had been maliciously misplaced.

unf, 18th, Texas & New Orleans, Mahl, Texas, a mixed train running backwards was derailed by running over a cow, and the caboose was overturned. An officer of the road was killed.

xc, 19th, 11 p.m., Buffalo, Rochester & Pittsburgh, Summit, N. Y., a passenger train ran into a locomotive standing on a side track, but not clear of the main line, and the passenger engine was overturned. One fireman was killed and one trainman and one passenger were injured.

unx, 19th, 11 p.m., Gulf, Colorado & Santa Fe, Buna, Texas, a freight train was derailed and overturned, and the fireman was killed.

xc, 20th, 10 p.m., Philadelphia & Reading, Muncy, Pa., several cars of a freight train which had been cut apart at a water tank were wrecked when the forward part was pushed back to the rear one; and the wreck fouled the adjacent main track. A passenger train came along a moment afterward and ran into the wreck, and its engine fell down a bank. There was a dense fog at the time. The passenger fireman was injured.

*xc, 21st, 4 a.m., Mobile & Ohio, Union City, Tenn., a number of cars broke loose from a freight train while ascending a grade and ran back into the head of a following freight, wrecking one engine and six cars. The wreck took fire and was mostly burnt up.

xc, 21st, Lake Shore & Michigan Southern, Stoneboro, Pa., collision of freight trains, one of which had become uncontrollable on a steep grade. Two trainmen were injured.

unx, 22d, Suffolk & Carolina, Edenton, N. C., the locomotive of a freight train was derailed and the fireman was killed.

o, 22d, Missouri Pacific, Centertown, Mo., the locomotive of a freight train was wrecked by the explosion of its boiler, and the engineman was killed.

unx, 23d, St. Louis & San Francisco, Dealey, Texas, a freight train was derailed at a switch and many cars were wrecked. A number of boarding cars standing on a side track were badly damaged, and nine of their occupants were injured, two of them fatally.

o, 23d, 6 a.m., Pennsylvania road, Thomson, Pa., the locomotive of a freight train was wrecked by the explosion of its boiler, and the wreck damaged an engine and a number of freight cars standing on a side track. Of eight men on the tender of the standing locomotive one was killed and all of the rest were injured.

xc, 24th, 2 a.m., Southern Railway, Spartanburg, S. C., passenger train No. 35 collided with some freight cars which had escaped control while being switched, and the engine and four cars were wrecked. The engineman and baggageman were injured.

rc, 24th, Alabama Great Southern, Eppes, Ala., rear collision of freight trains, wrecking several cars. A tramp was killed and two others were injured.

unf, 24th, 11 p.m., Baltimore & Ohio, Worthington, W. Va., passenger train No. 4 was derailed by a landslide and the engine was wrecked. The engineman and fireman were injured.

o, 24th, 5 a.m., Pennsylvania road, Mineral Point, Pa., a locomotive engaged in pushing a freight train was wrecked by the explosion of its boiler. Two trainmen were killed and two injured.

*rc, 25th, 5 a.m., Fort Worth & Denver City, Carlyle, Texas, rear collision of freight trains. A man in the caboose was killed. Two cars of oil and the caboose took fire and were burnt up.

dr, 25th, Illinois Central, Oxford, Miss., a freight train was derailed at a point where the track had been weakened by a heavy rain, and nine cars were ditched. One trainman was killed.

unf, 26th, Baltimore & Ohio, Smithfield, W. Va., a freight train was derailed by a rock which had fallen on the track, and the engine fell down a bank. The fireman was killed and two other trainmen were injured.

*†unx, 26th, Jacksonville & St. Louis, Ayers, Ill., a freight train was derailed on a trestle and the caboose was overturned, badly injuring 13 people in it, two of them fatally. Most of the injuries were due to fire, which started from the stove in the caboose.

bc, 27th, Southern Pacific, Benicia, Cal., butting collision of freight trains, wrecking both engines and several cars. The engineman and fireman of the westbound train were killed. The westbound train had run past the appointed meeting switch, and the only explanation is that the engineman and fireman were both asleep.

bc, 27th, Union Pacific, Wahsatch, Utah, butting collision between a freight and a work train, both running at full speed. Both enginemen and both firemen were injured.

bc, 27th, Buffalo, Rochester & Pittsburgh, Warsaw, N. Y., butting collision between a freight train and an empty engine; one employee killed. The conductor and engineman of one of the trains had forgotten a telegraphic order and they were indicted on a charge of manslaughter in the second degree.

xc, 27th, Pittsburgh, Cincinnati, Chicago & St. Louis, Safford, Ind., a southbound passenger train ran over a misplaced switch and collided with a freight train standing on a side track. The engineman was killed and the fireman and baggageman were injured, the former fatally.

dr, 27th, St. Louis, Iron Mountain & Southern, Prescott, Ark., passenger train No. 4 was derailed at a point where the track had been weakened by rain, and the engine fell down a bank. The engineman was killed and three other trainmen were injured.

*rc, 28th, Southern Pacific, Hooker, Cal., an empty engine ran into the rear of a preceding freight train, wrecking the caboose and one freight car. The wreck took fire and was mostly burnt up; one trainman injured.

bc, 28th, Northern Pacific, Missoula, Mont., butting collision of freight trains, wrecking both engines and several cars. Two tramps were killed and five trainmen and one tramp were injured.

xc, 28th, Chicago & North Western, Lytles, Wis., a passenger train ran over a misplaced switch and collided with a tool car standing on a side track. Four employees in the tool car were injured.

xc, 28th, Chicago, Rock Island & Pacific, Herington, Kan., a passenger train collided with a freight engine, which was on the main track at the station without authority. Six passenger cars were derailed. Three trainmen were injured, one of them fatally.

dr, 28th, 1 a.m., Cleveland, Cincinnati, Chicago & St. Louis, Avon, Ind., passenger train No. 43 was derailed by a broken rail and two passenger cars were overturned. Thirteen passengers were injured.

The same train, after being reorganized, was again derailed a few hours later at Carbon, Ind., at a derailing switch.

dn, 28th, 4 a.m., Wisconsin Central, Des Plaines, Ill., a southbound freight train was derailed at a derailing switch approaching the Chicago & North Western track, and the engine and 11 cars were wrecked, the engine being overturned. It is said that the engineman had fallen asleep. The engineman, fireman and one brakeman were injured, the engineman and fireman fatally.

xc, 29th, Illinois Central, Fulton, Ky., passenger train No. 203 collided with a switching engine; two trainmen injured.

bc, 30th, Baltimore & Ohio, Carbon, Pa., butting collision between an eastbound passenger train and a westbound freight, wrecking both engines, two baggage cars and several freight cars. The engineman of the passenger train was killed and three other trainmen were injured. It is said that the collision was due to a misplaced switch.

unf, 30th, Norfolk & Western, Alnwick, W. Va., a freight train was derailed by running into a landslide, and the engine and three cars fell into a river. All of the men on the train were thrown into the water and had to swim ashore. The conductor and engineman were slightly injured.

Some Dangers in Electrical Railroads.

Mr. George Westinghouse has pointed out certain dangers which, in his opinion, should be guarded against in the fitting of trains with electrical apparatus. Mr. Westinghouse says: "It is not very apparent how these dangers can be guarded against. A lifelong experience, however, in connection with safety appliances upon railroads has caused me to view the subject from quite a different standpoint from that usually taken, especially by inventors and promoters, and in some cases by manufacturers of electrical apparatus, who evidently dislike to emphasize the dangers attending the application of so much electrical machinery beneath the ordinary combustible cars now generally in use and the utilization of which has been contemplated in order to keep down the total cost of installation.

"I believe a further useful purpose will be served by particularizing some of the dangers to be guarded against in the fitting of trains with electrical apparatus:

"(1) A great advantage of electric traction is the possibility of a much higher speed. This, however, while not extending the vision of the engineer in charge of the apparatus, will require a greater distance within which to stop the train.

"(2) When many tons of electrical apparatus are distributed beneath several cars of a train, and of necessity more or less loosely supported, and between which and the rails and roadbed there is but a small clearance, it is evident that much greater precautions will have to be taken than is ordinarily the case with the running gear of the present steam cars, derangements in which have often been the cause of accident.

"(3) Electrical apparatus supported beneath the car can develop, by means of a short circuit, heat-energy sufficient to instantly ignite cars of wood construction, and this has occurred repeatedly, notwithstanding the presence of safety appliances, intended to guard against such occurrences.

"(4) When a total wreck results from an accident (and experience has shown that accidents are inevitable, whatever the mode of propulsion) the debris scattered over the 'live' and other rails would render useless the ordinary circuit-controlling devices which may be located upon the cars. This emphasizes the importance of a non-combustible construction of cars."—*Journal of the Franklin Institute.*

Railroad Conditions in Natal.

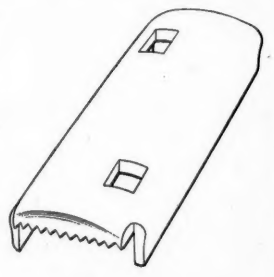
The *Economist* prints an article on railroad conditions of Durban, by way of Maritzburg and Ladysmith to the in Natal in which it says that the Colony is at present enjoying the excitement of what is there called a political crisis, but what is in reality a railroad dispute. The chief disputants are men who know little and care less about politics, but have a keen sense of the convenience of railroad communication to themselves or their particular friends as owners of property or merchants. The two main propositions before the Colony are whether or not the present trunk line which runs from the Port Transvaal frontier at Lang's Nek, shall be duplicated, or whether a totally new line shall be built by a shorter route. The policy adopted by the Government is to double the present main line, and this is diametrically opposed by the strong recommendation of Sir David Hunter, the able General Manager, who recommends a new railroad running in a "bee line" from the port to a point on the existing system some miles to the north of Ladysmith.

The question seems to be largely a matter of self-interest and perhaps the only constituency which can take up a fairly impartial attitude is Durban, which is the only port serving the railroad, and will have the trade, whichever line is built. In Durban all the four members have declared themselves in favor of Sir David Hunter's alternative line. The Legislative Assembly being equally divided, it was found impossible to arrive at a decision.

The Governor was forced to proclaim dissolution of Parliament and the Colony is now in the throes of a general election. The sole justification of an ambitious railroad project in Natal is the traffic to the gold fields, since all that Johannesburg wants is a good service, and it is rather hoped to get this by way of Delagoa Bay than by either of the lines which the people of Natal are squabbling about. Either of the schemes proposed will involve an outlay of approximately £5,000,000.

Smith's Tie Plate.

The engraving shows a tie plate invented and patented by Mr. E. M. Smith, Roadmaster of the Burlington & Missouri River Railroad at Denver. The principal points in the design of this, to which Mr. Smith calls attention, are the arched upper and lower surfaces with dependent side flanges, the shoulders on the upper surface to help keep the rail in place, and on the lower surface to bear against the tie lengthwise, and, finally, the transverse row of teeth at the outer end of the plate. In the engraving herewith the shoulder, which is designed to give a bearing to the rail flange, is not shown. We are informed that two forms of the tie plate are made, one with rail shoulder and the other as here shown. Otherwise, the two forms are identical.



One of the objects is to prevent the ties from rocking, which object it is believed will be realized by the arched crown of the tie plate. Another object is to prevent the plate rocking or tilting on the tie itself. Further, it is believed that the form of the dependent flanges and the transverse row of teeth will secure the plate to the tie against lateral and longitudinal movement. It is claimed further that this plate will not split the tie, and that it will not warp, buckle or break; that it can be easily driven into any tie and that it can be cheaply made.

The width of the tie plate is 3 in., thus concentrating the direct bearing on the tie, and also giving the greatest practicable distances between the supports on the ties. This feature was recommended at the 1898 annual convention of the Roadmasters' Association as helping to prevent churning.

The side flanges are 1 in. deep. The inner sides are vertical, to guard against splitting the tie and to help, in co-operation with the top of the plate when loaded, to crowd the fibers of the wood together. The outer sides of the flanges have a double curve; starting at the cutting edge the curve is convex and then concave. It is claimed that this combination gives two diagonally opposite forces during the passing of a train; one acting on the convex surface as a shoulder and the other acting simultaneously on the opposite concave surface as an anchor. This prevents rocking of the plate. The object of the shoulders is sufficiently obvious, namely, to help keep the rail accurately to gage.

Imports and Exports of Iron and Steel—Eleven Months.

According to the Treasury Bureau of Statistics, the value of iron and steel imports for the year 1902 will exceed that of any year since 1891. The figures cover 11 months of the year 1902 and show that during that time the importations were more than double in value those of the corresponding months of the preceding year. The figures being: 1901, $18,267,862; 1902, $36,766,961. The total production of the pig iron in the United States for the whole year is estimated at fully 17,500,000 tons against 15,878,000 tons in 1901, which was the highest figure recorded. Nevertheless the imports of pig iron during the 11 months increased about 850 per cent. over 1901.

The value of iron ore imported increased from $1,523,262 to $2,363,509 for the 11 months of 1902. Pig iron increased in value from $1,496,954 for the 11 months ending November, 1901, to $8,995,029 for the 11 months of 1902. Blooms, ingots, slabs, bars of steel, etc., increased from a little over $1,000,000 to over $7,000,000, and machinery from $2,718,000 to $3,831,000. In only one item, tin plate, was there a reduction; the value of tin plate imported in the 11 months of 1902 being $3,603,426 against $4,594,786, and the quantity of 60,115 tons in 1902, against 75,155 tons in the same months of 1901.

The table shows the importations of the principal articles of iron and steel manufactures and iron ore for the 11 months ending with November, 1902, compared with 1901:

	1901.	1902.
Iron ore, tons	887,337	1,063,025
Pig iron, tons	53,289	507,010
Bar iron, tons	21,516	29,118
Ingots, blooms, slabs and bars of iron, tons	7,981	279,658
Sheet, plate and taggers' iron or steel	5,598	6,870

Although the figures for the exports of iron and steel for the 11 months ending with November, 1902, show a decrease in quantity, there was an increase in several important items. The following table gives the figures for 1902 compared with those of the corresponding period of the preceding year:

	1901.	1902.
Iron ore, tons	64,558	87,210
Pig iron, tons	75,843	26,277
Bar iron, tons	19,196	21,503
Bars or rods of steel, tons	8,567	23,745
Billets, ingots and blooms, tons	27,286	2,409
Rails, tons	302,232	66,854
Structural iron and steel, tons	49,089	51,776
Sheets and plates (iron and steel)	34,875	19,288
Car wheels, number	24,680	20,887
Locomotives, number	419	354

The total value of iron and steel exported, not including ore, was $94,112,782 in 1901 and $90,136,024 for 1902.

Electric Railroads to be Built During 1903.

The *Street Railway Journal* has recently published a list of extensions and changes projected by electric railroads for the year 1903. Below is a list of the more important projects.

BUFFALO & DEPEW RAILWAY, Depew, N. Y., will build 60 miles of track, two new car houses and one central power station with sub-station. Complete equipment for power house and shops is to be built, also rolling stock. Orders are to be placed during the next two months.

COLUMBUS, NEW ALBANY & JOHNSTOWN TRACTION, Columbus, Ohio, within the next 90 days will award contracts for 18 miles of road.

CONSOLIDATED TRACTION, of Indianapolis, Ind., expects to build a line from Indianapolis to Crawfordsville; a line from Frankfort through Lebanon, and a line from Lafayette to Lebanon parallel to the Chicago, Cincinnati, Cleveland & Columbus. A total of about 106 miles of line will be built. Contracts will be awarded within a few months.

DANVILLE, URBAN & CHAMPAIGN, Champaign, Ill., will, within the next three months, award a contract for a 33-mile interurban road. A car house, 50 ft. x 100 ft., will be built.

DAYTON & NORTHERN TRACTION, Dayton, Ohio, is building 48 miles from Greenville to Union City, Winchester and Muncie; also power house at Winchester, Ind.

DENVER & NORTHWESTERN, Denver, Colo., is about to place contracts for a 25-mile extension into the Rocky Mountains.

DURHAM TRACTION, Durham, N. C., will build 15 miles of single track.

FLORENCE ELECTRIC STREET, Florence, Colo., expects to build about 25 miles of track, power house, two car houses, repair shop, sub-station and six bridges. The company will purchase two 220-kw. generators, two 250-h.p. direct-connected Corliss engines, six 250-h.p. boilers, about 20 cars and 50 motors, and two sprinklers.

GAINESVILLE & DAHLONEGA, Dahlonega, Ga., is now building repair shops and a car house in Gainesville. Rails will be required for 15 miles of track.

GRAND VALLEY, Brantford, Ont., will build 20-mile extension and car house of brick.

INDIANAPOLIS, SHELBYVILLE & SOUTHEASTERN TRACTION, Shelbyville, Ind., will, within the next three months, place contracts for the extension of the road to Batesville, a distance of 40 miles. The road is now being surveyed. It is not yet determined as to what car houses, power stations and other structures will be built.

KITTANNING & LEECHBURG STREET, Kittanning, Pa., will build a power house. The road is to be extended 15 miles. Contracts will be placed during February and March.

MOLINE, EAST MOLINE & WATERTOWN, Moline, Ill., will rebuild 10 miles of its road; also build a new car house, 20-car capacity, and a power station.

MOUNT VERNON ELECTRIC, of Mount Vernon, within two months, will let contract for a 14-mile extension and the building of a car house with a capacity of 20 cars. The company will purchase two combination interurban cars, an 18 x 42 Corliss engine, a 125-h.p. corrugated furnace boiler and a 150-kw. direct-connected railway generator.

OHIO & INDIANA AIR LINE, of Toledo, Ohio, will build 95 miles of track (single) between Fort Wayne, Ind., and Toledo, Ohio, contracts for which are to be let within the next three months. The company will be in the market for everything required for such a road, including the rolling stock, power house and repair shop apparatus, car houses and other structures.

SCHENECTADY RY., Schenectady, N. Y., is building a double-track extension of 13 miles, and a new car house.

WARREN & JAMESTOWN ELECTRIC, Warren, Pa., will build 20 miles of track, a power house and several bridges, and will purchase storage batteries, dynamos, rotary transformers, six interurban cars, with tracks, four motor equipments and air-brakes. Contracts will be let during the next six months.

WISCONSIN RAPID TRANSIT, Fond du Lac, Wis., expect to build from Fond du Lac to Waverly Beach, on the Fox River Valley Electric Railway, and to the city of Chilton, Wis., a total distance of 42 miles. The road will be located on the east shore of Lake Winnebago, in Fond du Lac and Calumet Counties. The line is surveyed and part of the right of way secured. A power plant will be built at or near Calumet Harbor. The company will negotiate to let the contract for building and equipping the road.

Eben Briggs Thomas.

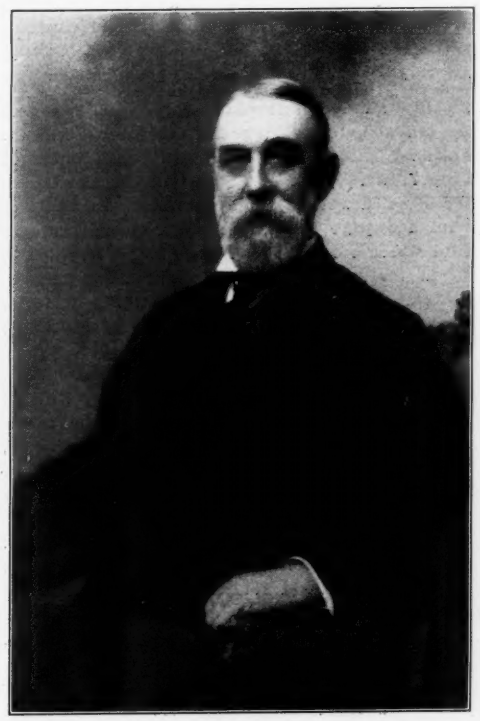
We have already said that Mr. E. B. Thomas has resigned as Chairman of the Board of the Erie to be able to devote more time and energy to his duties as President of the Lehigh Valley Railroad, and this makes an opportunity to say a few words about his career. He was born in Cleveland, O., in 1841, and at the age of 15 began his business life in the employ of the American Telegraph Company. He was engaged in business until 1870, when he was made Receiver of the Lake Shore & Tuscarawas Valley Railroad, now the Cleveland, Lorain & Wheeling. Later he became General Manager of the Cleveland, Columbus, Cincinnati & Indianapolis, and from September, 1885, to February, 1888, he was 2d Vice-President and General Manager of the Richmond & Danville, now embraced in the Southern System. He then became connected with the Erie as 2d Vice-President, in charge of the lines west of Salamanca, and in October of 1888 he was removed to New York and put in charge of all the lines of the company. Afterwards, he became 1st Vice-President, and still later was one of the Receivers. On the reorganization and the formation of the Erie Railroad Company late in 1895 he was elected President, and this position he kept until May, 1901, when he became Chairman of the Board, being succeeded in the Presidency by Mr. Underwood.

It will be observed that Mr. Thomas had 18 years of active and responsible railroad work before he joined the Erie, and in those years he had become well-known; but, so far, his greatest work has been in his 15 years of service with the Erie. Those years have been years of reorganization and re-establishment. The finances, the working staff and the physical condition have all been overhauled, and put on a substantial foundation. The relations of allied and subordinate companies have been changed, greatly to the advantage of the Erie. Unfortunate leases inherited from former administrations have been modified or annulled and properties have been bought. The purchase of the control of the New York, Susquehanna & Western and of the Pennsylvania Coal Co. was possibly the most important strategic accomplishment of Mr. Thomas's administration.

The condition of road and equipment has been revolutionized in recent years. Heavy expenditures have been made systematically for additions, improvements and betterments, and charged to working expenses as well as to capital. It is probably all of three years ago that Mr. Thomas said to us that if 30 million dollars could be spent on the property it would earn its own interest and leave money over for net. Perhaps this will now be done, but Mr. Thomas had to work within the limits set at the reorganization of the company. During his administration the common stock has risen in the market from 8 to 45 and the first preferred from 27 to 73.

Mr. Thomas would be the last man to take to himself the credit for what others have done in the reorganization of the Erie or the credit for the results of general good times, but during his administration he has been possibly the most active and diligent man in the whole staff, from the top to the bottom, and as he has steadily borne the responsibilities through years of struggle, so he must have the credit for the successes of his administration.

In the Lehigh Valley he succeeds a strong man and inherits another difficult situation. It is fortunate that



Eben Briggs Thomas,
(President of the Lehigh Valley Railroad.)

men like Mr. Thomas, with every inducement to retire to private life and enjoy themselves, should be willing to go on and carry the burdens of the great corporations.

Interlocking in Texas.*

The new law in Texas requiring suitable signals at grade crossings of one railroad with another, and the order of the Commissioners for the installation of signals at 25 crossings, were noticed in the *Railroad Gazette* of June 13, last, page 444.

Of about 250 railroad grade crossings in Texas only one (at Galveston) was interlocked before the State law requiring interlocking was passed. In connection with their order last June the Commissioners issued rules governing the installation of interlocking, and it was ordered that each of the 25 crossings be signaled before July 1, 1903, under penalty of a fine of $500 a week.

Only two of these have as yet been signaled, those built by the G., H. & S. A. at crossings with the S. A. & A. P. A 24-lever machine was put in at Flatonia and a 16-lever machine at San Antonio. Part of the material was from the Pneumatic Signal Company, and part from the Union Switch & Signal Company.

In these plants the pipe carrier foundations are of concrete 7½ in. x 9½ in. x 24 in., but instead of the usual wood cap a cast-iron cap is used ¾ in. x 7½ in. x 14 in., with holes for ⅜ in. x 1¼ in. bolts for fastening pipe carrier sides. This design gives a very strong and light appearance. Wire lines to distant signals are supported on stakes made of old boiler tubes. A piece of ⅜ in. boiler iron takes the place of the usual 4 in. oak plank under switch and lock movements. Cast-iron brackets imbedded in concrete are used for crank, wheel, and compensator foundations, and old 50-lb. rails are used in place of 6 in. x 12 in. timbers in the leadout. The planks are fastened with bolts, using cast washers under the flange of the rail. Iron signal masts are set in concrete. The home signals are pipe-connected, and are fitted with three-light semaphore castings. Guard rails 200 ft. long or more are provided to keep a derailed train from running off the ends of the ties and tipping over. Pipe lines are covered with plank walks 3 ft. to 4 ft. wide so as to prevent any possibility of trainmen sustaining personal injuries while attending to switching duties. In Texas it is very easy for employees to collect heavy damages even when injured through their own carelessness.

Contracts for five other plants have been let. Four of these were let to the Union Switch & Signal Company by the Texas & Pacific. They are for 12-lever mechanical plants at each of the following crossings: G., C. & S. F. at Dallas; St. L. S. W. at Hodge; M., K & T. at Bells, and K. C. S. at Sulphur Cut-off, near Texarkana.

The G., C. & S. F. let the contract for a 24-lever Taylor all-electric interlocking, with all the latest improvements, for the protection of its crossing with the M., K. & T. at Temple. The Santa Fe has plans complete for all the other interlocking to be installed by it before July 1.

The H. & T. C. will soon start work at its crossing with the G., C. & S. F. in Dallas. Here there will be a 12-lever mechanical machine, four levers for derails, four for home signals and four to control electric semaphore distant signals. This road has plans completed for a 40-lever plant at the crossing with the T. & P. at Sherman; a 16-lever plant at M., K. & T. crossing Eureka; a 28-lever plant at crossing with M., K. & T. and St. L. S. W. at Waco, and a 28-lever machine at crossing with I. & G. N. at Hearne.

The T. & N. O. has plans completed for a 90-lever plant covering the three crossings with H. E. & W. T., the G. C. & S. F. and the I. & G. N. in Houston. These three crossings will be operated from two towers; there will be three three-track signal bridges. The T. & N. O. has about completed plans for a large plant at Beaumont at the crossing with the G. B. & K. C.

Plans have been approved for nearly all the other plants ordered by the Commission, but it is going to require some pretty fast work if all the work is done by July 1 this year.

The new law has led the old railroad companies to insist on the installation of interlocking at all new crossings; and considerable work is being done besides that described in the foregoing paragraphs.

The Chicago, Rock Island & Texas installed interlocking at its crossing with the Fort Worth & Denver City at Bowie early in 1902, and on December 5 the C., R. I. & M. put into operation a 24-lever mechanical plant at its crossing with the Ft. W. & D. C. at Dalhart; both of these were built by the Union Switch & Signal Company, as was also the 24-lever mechanical interlocking plant, installed by the G., H. & H., for protection of a draw bridge in Houston. A number of switches and signals on each side of the draw are operated from this tower, which is located near one end of the draw. The foundation is in the ground 24 ft. below the base of the rail, and the lower stories of the tower are of brick, with walls 18 in. thick.

The Union Switch & Signal Company has just about finished a 16-lever plant at College, and is now working on a 28-lever plant at Navasota for the I. & G. N. at the crossings with the H. & T. C.

The 16-lever plant at the crossing of the G., H. & S. A. and the El Paso Terminal Co., at El Paso, also being built by the Union Switch & Signal Company, will soon be ready for operation. All three of these are mechanical plants, built in the most substantial manner, with iron signal masts and concrete foundations.

The G., H. & N. built a 12-lever mechanical plant at its crossing with the S. A. & A. P., near Houston, although it was not ordered by the Railroad Commission. Iron pipe-carrier caps are used here, as well as other features like those at the G., H. & S. A. and S. A. & A. P. towers first mentioned; and the levers work so easily that at the opening, November 20, the leverman's duties were performed by two young ladies, from the State college.

The Galveston, Houston & Northern is just finishing plans for three interlockings at Galveston which will require about 120 levers and will have two signal bridges.

The N. Y., T. & M. will soon install a 24-lever plant at the crossing with the Cane Belt at Bay City, plans for which are now in the hands of the signal companies for bids.

At a meeting of signal men at Dallas December 29 to discuss the interlocking of the complicated crossing of the T. P., the M., K. & T., the G., C. & S. F., and the H. & T. C. at Fort Worth, a desire was expressed that such a meeting be held regularly once a month to discuss plans and standards. As a result the Texas Interlocking Association was formed with C. S. Corrigan, Assistant Signal Engineer of the Southern Pacific, Houston, President, and O. H. Lang, Assistant Engineer General Office Texas & Pacific, Dallas, Secretary. All persons interested in interlocking in Texas are invited to attend the meetings, which will be held at the Oriental Hotel, Dallas, on the second Wednesday of each month.

*The names of the roads referred to herein by initials are:
Chicago, Rock Island & Mexico;
Chicago, Rock Island & Texas;
Fort Worth & Denver City;
Gulf, Colorado & Santa Fe;
Galveston, Houston & Northern;
Galveston, Houston & San Antonio;
Houston & Texas Central;
International & Great Northern;
Kansas City Southern;
Missouri, Kansas & Texas;
New York, Texas & Mexican;
Orange & North Western;
San Antonio & Aransas Pass;
St. Louis South Western;
Texarkana & Fort Smith;
Texas & New Orleans;
Texas & Pacific.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The important bearing of State laws on the demand for savings bank investment in high grade railroad bonds—a demand sure, sooner or later, to result in low rates for refunding as already seen—is shown by the recent returns of the Connecticut Bank Commissioners. In that State up to the year 1899 the law relating to savings bank investment in railroad bonds was severely restrictive. Except the consolidated refunding bonds of roads within the State the banks could invest only in the first mortgage bonds of roads, which for five consecutive years previous to the investment had paid an annual dividend of not less than 4 per cent., upon all stock outstanding. But in 1899 the maturing of old high rate railroad loans, the high price of municipal securities and the lowered return on real estate loans forced a change and the Legislature opened for savings bank investment all the bonds of eleven railroads in New England and the consolidated bonds of thirteen large outside railroad companies provided they had paid any regular dividend on all outstanding stock for five previous years. The results are striking: Using round figures, in 1898, the year before the change, the Connecticut savings banks had total assets, including cash, of $173,925,000; in 1902 on Oct. 1, $214,892,000. During about three and a half years since the change of the law their investments in real estate loans have increased only from $64,898,000 to $70,204,000, or about 8 per cent.; in municipal and United States bonds the investments have fallen from $43,183,000 to $42,699,000, or a decrease of a little more than 1 per cent.; and investments in railroad bonds have risen from $36,095,000 to $69,461,000, an increase of $33,366,000, or more than 92 per cent. In 1898 railroad bonds formed less than 21 per cent. of the total assets of the Connecticut banks, while in 1902 they formed more than 32 per cent., and are increasing rapidly. Moreover, as, in Connecticut, all savings banks investment are open to trustees, also, the increased demand from that source must be large, though it can only be guessed.

One of the most important of recent great railroad transactions is the change of control of the Reading. The passing of this control to the Baltimore & Ohio became probable some months ago. Later it seemed almost certain that the Pennsylvania interests (through the Baltimore & Ohio) and the Vanderbilt interests had acquired control. Now, it is made known that a majority interest in the Reading stock is divided between the Baltimore & Ohio and the Lake Shore. This carries with it the Central of New Jersey. It carries also the control of something like half of the unmined anthracite in Pennsylvania. In general, this further consolidation of vast interests, which should be worked with a sustained and harmonious policy, is a long step towards the continued prosperity of the country, and in particular, it is a most important step in the great and rapid development of the Baltimore & Ohio. That road now has ample terminals on the waters of New York harbor. The Staten Island terminals which it has long owned are valuable, but the central of New Jersey facilities will make it unnecessary to spend the large amount of money which the Baltimore & Ohio would otherwise have been obliged to spend to get adequate terminals at the New York end of its system. Furthermore, the Baltimore & Ohio will be brought into communication with some of the richest and busiest territory of Pennsylvania, which is to say of the world. It already has magnificent command of a country which is destined for generations to furnish a tonnage greater than has ever been furnished by any other district in the world, namely, central and southern Ohio and the Pittsburgh district. Beyond this, the Baltimore & Ohio commands a most important coal district in West Virginia and in Western Pennsylvania. It is assumed that ultimately the lines now worked and controlled by the Baltimore & Ohio system will be worked under one head, although Mr. Loree specifically says that the autonomy of the Reading will be preserved. However that may be, the Baltimore & Ohio has now taken a place which a few years ago would have excited the imaginations of journalists and magazine writers to the production of cords of copy, and to-day they don't stop to ask what is going on. Surely we have grown used to great things.

The Interstate Commerce Commission has just issued the annual report of its Statistician for the year ending June 30, 1901. The principal totals of this report were published in a bulletin issued last September, and were given in the *Railroad Gazette* of September 5, page 686. The number of miles of railroad for which earnings are reported is 195,562. The only new features in this report are a summary of freight car mileage and a table classifying taxes on the basis of the laws of the several States, according to which the taxes are paid. The total mileage of freight cars in the year was 12,811,211,703. This, divided by the number of freight cars reported as owned or leased (1,464,328), makes an average movement of about 24 miles a day for each car. Probably, however, the total mileage includes the mileage of private cars; if it does, the average per day must, of course, have been less than 24 miles, as there are something like 130,000 such cars in use in the country. Moreover, this number, representing an addition of about 9 per cent. to the total number of cars, would reduce the average mileage of railroad companies' cars in a proportion larger than this, because a large share of the private cars are used in those kinds of traffic where long trips and fast time enable each car to perform a large amount of service. The total amount of taxes paid by the railroads in the year under review was $50,944,372; and by far the larger part of this sum is assessed according to the value of real and personal property; that is to say, an ad valorem tax, as distinguished from a specific tax. In nearly all of the States at least four or five different methods of taxation are in effect, though in each one there is one method which covers the bulk of the assessment, while under the other heads only small amounts appear. There are only six States in which the bulk of the money collected in taxes is assessed on gross or net earnings, revenue or dividends; these are Maine, Michigan, Maryland, Minnesota, Vermont and Wisconsin. In Connecticut, Massachusetts and Pennsylvania a large percentage of all the taxes is based on the value of stocks or bonds, or on a valuation based on earnings. In Connecticut this plan covers almost all of the property used in the operation of the road; in Massachusetts it covers about two-thirds. In Pennsylvania all of the seven classes into which the statistician divides taxes contain items of considerable amount; thus, on the value of real and personal property, $580,885; on the value of stocks, bonds, etc., or on valuation based on earnings, $1,610,124; specific tax on stocks, etc., $796,367; on earnings, $580,001; on traffic, or some physical quality of property, etc., $2,002; on property not used in operation, $291,050; United States internal revenue, $160,312.

Underground Telegraphs.

Some of the railroads have already suffered heavy losses this winter by storms which damaged their telegraph lines, and one large company in the West is said to be seriously considering an underground line. Quite likely the result of such consideration will be now, as it has been on similar occasions in the past, that the cost of an underground line would be unjustifiable; but it is of interest, nevertheless, to note that in England underground telegraphs several hundred miles long have lately been laid. A letter telling of this was given in a recent issue of this paper.

The trouble with the underground idea in this country is that in nearly or quite every situation where the money for such a line could be afforded, the inconvenience of a three days' interruption can be put up with; or at any rate is put up with. Telephone lines and alternative telegraph routes are almost invariably available to prevent a complete stoppage of communication. Moreover, the most destructive sleet storms are usually confined to a territory 50 miles square, or less.

The storm which occurred in New Jersey on Feb. 21 last is still fresh in the reader's memory. On that occasion the Pennsylvania Railroad telegraph lines between Jersey City and Philadelphia were out of service between two and three days, we believe; but the officers of the company promptly denied the report, which was widely published after the storm, that they intended to lay an underground line between the cities named. They must appreciate the usefulness which such a wire would possess in a sleet-storm as well as anybody can, for they have had sleet-storms before, and, as we know, seriously considered laying an underground line several years ago. But they also appreciate the disadvantages which would make the use of such a line undesirable in ordinary weather and, presumably, have decided that it would be an expensive luxury, the value of which could not be put at a very high figure in dollars and cents. In view of the high cost, it does not seem likely that any railroad or telegraph company would think of putting all of its wires underground for a long distance on any line, and therefore the objectionable features of pole lines would still have to be put up with. The dangers from poles blowing down or being knocked over would still exist, and the force of linemen could not be appreciably reduced. Money for preventing interruption by sleet could be better spent, no doubt, in putting up more substantial pole lines, and renewing them oftener. A railroad may easily make the mistake of paying, for insurance against train delays, more than it is worth.

In the storm of last February it was said that Philadelphia telegraph offices were cut off from the outer world about three days; and this was commented on by the daily papers as a fact of profound importance. And yet it appears that, at the worst, our Quaker neighbors were able to have messages put on the wires for any point by taking them by railroad train only 25 miles. This means a delay of say one hour; or of two or three hours, if trains were run an hour apart. We are not here recommending a return to the slow habits of our grandfathers—although those habits are not without their conspicuous virtues—only pointing out a patent fact. If uninterrupted electrical communication were the sine qua non that it is assumed to be by the story makers of the daily papers, we should see the telegraph companies spending great sums to maintain it. As it is, we are afraid that such an expenditure would bring very meagre dividends. Logically, a company having a wire intact when most lines were out of service, ought to charge an extra price for telegrams so as to keep the storm-proof line from being crowded with unimportant telegrams; but how many messages would it get at, say, double or treble prices?

As far as train movements are concerned, the New York-Philadelphia line of the Pennsylvania can get along without wires better than any other road of its length in the world; for there are two tracks in each direction, and the block signals, less than one mile apart throughout the division, are mostly worked automatically without any line wires whatever; not even for the distant signals and the outlying switches.

But whatever may be the resources available to aid us in getting along without electric wires, we will end this old fogy article, for we know that it will grieve our friends of the electrical journals, who think that electricity, like the king, can do no wrong—or, rather, can never fail to be on hand to perform everything good that people may want. Moreover, speculation on the subject may be dangerous, for while we are speculating, the British government is acting; and we shall all want to see what results that action produces.

Timber Cultivation.*

The difference between planting, harvesting and converting into cash a cereal or other crop, all within the limits of one year, and the planting and harvesting of a lumber crop, covering an interval of 100 years more or less, is so considerable that in this country the serious consideration of it has been generally left to theorists and Germans—mostly Ger-

*Economics of Forestry, by Bernhard E. Fernow; 8vo, 520 pages. Published by Thomas Y. Crowell & Co., New York.

mans. The fact that in Germany, a densely populated country, the state forests produce three-quarters of the lumber needs of its people and a net income of $63,000,000 a year, together with a yearly increase of the amount of standing timber, somehow fails to impress us, although our own government receives no income from its forests and the trees are disappearing at a rate which will leave no merchantable timber standing in 50 years from now. Fifty years is a good while. We have little anxiety about the payment of bonds that are placed for that time, and we speculate only vaguely as to what may happen at the end of 100 years when the anthracite coal is used up. There are enough nearer-by bridges to cross.

Nevertheless the forestry theorists are gradually securing the attention of practical men, not by pointing to evils that are past, our waste of many times more than the national debt in pine and spruce lumbering alone, but by definite demonstrations that a reasonable rate of interest can be had from forest management on a large scale at the present prices of lumber. It may also be counted upon that lumber prices will certainly increase, and, as a further inducement, Professor Fernow adds: "The permanency and continuity of the investment, the amenity and dignity of large landed property, recommend it to large capitalists." This is having its effect and a number of experiments in timber cultivation on a large scale are well under way; but quite naturally these amateur undertakings are to income-producing forestry much as "fancy farming" is to the real thing. The crop of statistical information may be expected to be greater than the crop of dollars. Most of us like to live to see the results of our labors and the temptation to a "large capitalist" to begin somewhat late in life a 100-year undertaking is likely to be successfully resisted. It is work that should be done by the State in its own forest lands, and also by those corporations which are the largest makers and users of lumber. It is interesting, and possibly worth while to consider some statistics. That these statistics are quite surely inaccurate does not happen to affect their value:

In round numbers the *Railroad Gazette's* return of wooden freight cars built for steam railroads by manufacturing companies in 1902, is 123,000; passenger cars, 2,000; estimate of freight cars built by railroad companies, 30,000. The lumber requirements for this car-building is more than 600,000,000 ft. board measure, needing (because of waste in cutting) more than 100 million cubic feet of round timber.

From Government reports of previous years, and from knowledge of track work done last year, it is quite safe to say that as many as 150 million ties, requiring 1,000 million cubic feet of round timber, were used in 1902.

From exact figures given by one of the very large railroad companies, and from estimates of others, it is probable that lumber requiring 100 million cubic feet of round timber was used in 1902 for railroad structures and permanent way, other than ties.

This total of more than 1,200 million cubic feet for these railroad uses is quite nearly one-fifth of the sawed timber annually cut in the United States, and indicates the extent to which the railroad corporations have a money interest in forest ownership, in tree planting, protection and economical cutting. Some of them, how many we do not know, already own considerable forest tracts, held mostly for the supply of ties, and wisely bought in view of the continually increasing cost which has been and must still go on. But on some of these lands we know—and on others we have reason to think—that the tie-timber cutting is so unscientifically and so wastefully done that as much as one-half the product, for a period of years, is being lost.

Probably the oldest living things are the "big trees" of California, the Sequoia of the Sierras, many of them more than 3,000 years old. If any such period were required for maturity, tree farming would be hopeless, but these trees came to maturity centuries ago and have grown little in old age. With some exceptions, in natural growth in virgin forest, sound trees more than 200 years old are unusual. Roughly speaking, the unprotected naturally-grown hard-wood and soft-wood trees profitably cut for lumber are from 100 to 150 years old. But the tree farmer should not accept even these smaller figures. Scientific forestry improves natural conditions. In natural forest surrouudings everything hinders the growth of the struggling trees. They race upwards for light, competing with all forms of forest growth and obstructing and killing each other with a terrible waste of energy. The virgin forest has great picturesque value, but as an economic producer of valuable lumber, either in time, quantity or quality, it is no more comparable with a well-cared-for forest than is a wild crab apple with a Northern Spy.

Considering the immense use of wood in this country—many times greater than in any other country and estimated at 350 cubic feet per person per year—and considering the rapid decrease of the supply, it is certain that the members of this, to us, new profession will find active employment. It is truly a science, but no code of rules can be formulated for the varied conditions that now exist. Where in one case the valuable white oak or walnut has been dragged out, or in another the pine or the spruce has been taken, where fires have swept through, or where trees of little value are choking out more desirable ones—each condition presents its separate problem of cutting, or planting, or seeding in such a way as to get the forest in order and to possibly secure a uniform and a paying crop. In Germany, where the forests are in order, there are two typically distinct methods which classify the systems so far as they can be roughly classified: About 28 million acres are managed under the "clearing and rapid removal" system; that is, all the trees on a given tract are of the same age and all are cut at one time, at maturity, and the tract is replanted. Few forests in this country would be manageable by this method, which prevails in four-fifths of the German forests. The remaining seven million acres are cultivated and cut under the "slow removal," or selection, and other systems studied out for special cases. This is what we must do, for almost all of our cases are "special," owing to the short-sighted and reckless cutting and burning which was the inevitable and probably unavoidable result of having rich stores of valuable spruce, pine and high-priced hard-woods readily available and convertible into money.

Few engineers will agree with the statement in Professor Fernow's excellent treatise that "metal ties, except in initial cost, have proved themselves superior in all other respects" to wooden ties. Relief in this matter is rather to be looked for in the use of preservative processes, and, in view of the decreasing supply and increasing cost, from the purchase by railroad corporations of woodlands and the employment of a trained forester to secure a permanent and uniform supply from them.

Freight Traffic in Russia.

The growth of railroad freight traffic in Russia of late years has been very rapid, probably exceeded in no other country except this. In 1896 it amounted to 14,860 millions of ton-miles; in 1900 to 21,340 millions—an increase of 44 per cent. in four years. The total in the later year, however, seems absurdly small for a country of more than a hundred million inhabitants and larger than all the rest of Europe. It is considerably less than the freight movement of the three States of Ohio, Michigan and Indiana; while Russia has 15 times their area and about 12 times their population. The significant thing, however, is the *growth*, due largely to an increase in railroads, but also to some extent to industrial development in a country heretofore almost wholly agricultural. This does not include the traffic on Russia's Asiatic railroads, which is as yet comparatively insignificant in amount, in 1900 amounting to less than 4 per cent. of the traffic of the European lines.

The density of the freight traffic on the Russian railroads is as great as the average in this country, where as nowhere else in the world except Canada and Australia, lines have been built through new country in anticipation of population and production. In Russia the railroads have not been allowed to crowd each other. The freight traffic per mile of railroad in the three American States before named was a third greater than on the Russian railroads.

The average length of haul in Russia, as might be expected from the size of the country, is greater than in any other European country, amounting to no less than 311 miles in 1900. This may not properly be compared with the average haul reported for our railroads (129 miles in 1899), because the latter is the average of the companies, while one shipment often passes over many companies' lines.

Of the Russian tonnage in 1900, just about one-fourth was consigned to seaports or to border stations, and was, doubtless, for the most part exported; but the exports by rail, through the stations on the Prussian and Austrian border, were comparatively small, and not nearly so great as the imports through those stations. This is probably because the parts of Germany and Austria adjacent to Russia themselves produce a surplus of grain, the chief Russian export, while Russia imports considerable coal from Prussia (Silesia). The total imports are less than 14 per cent. of the Russian rail freight.

Grain formed 15.4 per cent. of the tonnage in 1900, and coal 18½ per cent.; yet the total coal shipments by rail were only 13,320,000 tons; or about 250 lbs. per inhabitant. This is an indication of one of the formidable obstacles Russia finds in the way of its industrial development, which has only fairly been begun.

November Accidents.

We publish in another column of this issue a condensed record of the principal train accidents which occurred in the United States in the month of November. The record contains accounts of 43 collisions, 21 derailments, and 4 other accidents. Those which were most serious, or are of special interest by reason of their causes or attending circumstances, occurred as follows:

*1st, Glyndon, Minn.	17th, Bolivar, Pa.
*3d, Meyersdale, Pa.	17th, Tallahassee, Fla.
5th, Meadows, N. J.	*†26th,, Ayers, Ill.
*9th, Barger, W. Va.	28th, Avon, Ind.
*16th, Fremont, Ohio.	30th, Carbon, Pa.

Only two accidents appear to have been fatal to passengers. In one of these, the worst of the month, the derailment at Ayers, the passengers were in the caboose of a freight train and were fatally burned; in the other case the passenger was in a freight car, being a live-stock attendant. Cases like that at Ayer, where passengers were being carried in a vehicle which was at the rear end of a freight train, and necessarily was heated by a stove, throw a significant light on the comparisons which are often made between the accident records of this country and those of countries like England, where passengers are very rarely carried on freight trains, and where, if they were so carried, hot water cans would probably be made to answer for heaters. The derailment at Meadows happened to one of the fastest trains in the country, but appears to have resulted very fortunately, considering the circumstances. In the case of the Carbon collision it is said that the switch which was left misplaced by a forgetful brakeman was provided with a distant signal but that the connections were out of order, so that the lamp showed white when it ought to have shown red.

The number of electric car accidents in November was 13; persons killed 5, injured 59.

The Interstate Commerce Commission has issued an order requiring each and every common carrier subject to the provisions of the "Act to regulate commerce" to report each year the tonnage, ton-mileage, earnings, and receipts per ton per mile of grain, hay, cotton, live stock, dressed meats, anthracite coal, bituminous coal, and lumber carried *in carload lots*. For the year ending June 30, 1903, the order covers only the freight movement of the six months from Jan. 1 to June 30, 1903. It will be observed that the new requirement embodied in this order is that requiring ton-mileage and receipts. The *shipments* (weight) of these commodities are already required, and these (including less-than-carload shipments) will continue to appear in the reports as in the past; as will also the reports of other commodities. The new statement, embracing only full carloads, will be useful chiefly for the last column, average receipts per ton per mile.

NEW PUBLICATIONS.

Engineering Education. Proceedings of the 10th annual meeting of the Society for the Promotion of Engineering Education, held in Pittsburgh, 1902. 12mo., 300 pages, indexes. New York: Engineering News Publishing Co. To members, $1.50; to libraries, $2; to others, $2.50.

The 10th volume of the Proceedings of this Society is considerably smaller than other recent volumes, nevertheless it contains a number of interesting papers concerning various phases of the education of engineering students.

The Secretary calls especial attention to two features. One of these is the statistical report on the present status of engineering education in the United States, Canada, Australia and England. The committee finds that there are in the United States 114 colleges giving engineering courses, and we should guess that in these courses 18,000 students are enrolled. Prof. Marburg (who writes the report) did not get reports from all the colleges and we have added 1,600 to his figures as a fairly close estimate.

The other special feature of which he speaks is a combined index to the 10 volumes so far issued. This index is sold in paper at 25 cents and in cloth at 50 cents, and may be had by addressing the Secretary, Prof. C. A. Waldo, Lafayette, Ind.

TRADE CATALOGUES.

From Steelton to Mandalay.—The Pennsylvania Steel Co. has distributed a pretty and interesting pamphlet with the title given above. This is a short description and pictorial history of the construction of the celebrated Gokteik viaduct, in Burma. The reader of the *Railroad Gazette* will remember the circumstances of the building of this great bridge. It was built at Steelton under the immediate direction of Mr. Reynders, Superintendent of the Bridge and Construction Department, after specifications laid down by Sir Alexander Rendel & Co., and was erected by the Pennsylvania Steel Co. The total length of the structure is 2,260 ft.; its greatest height above the gorge is 320 ft. The erection was accomplished in nine months. The pamphlet contains an account of the official opening, reprinted from *The Pioneer*, of Allahabad, a short account of the local conditions, etc., reprinted from the *World's Work*, and a description of the

viaduct reprinted from the *Engineering Record*. There are many interesting and effective half-tone cuts made from photographs.

Semi and Fully Inclosed Motors is the title of Bulletin No. 29 issued by the Crocker-Wheeler Company, Ampere, N. J. It contains 20 pages and is chiefly devoted to the description and illustration of their form I motors. The illustrations include a number of splendid half-tones showing the application of their motors to modern machine tools.

The 1903 Asbestos Catalogue of the H. W. Johns-Manville Co., New York, shows asbestos in many conditions. The arrangement of the catalogue is such that quick reference may be made to any article. Each section has its own table of contents and there is also a complete alphabetical index.

The Training of the Special Apprentice.*

The special apprentice who has completed a course of study in mechanical engineering should serve one year on machines, one year on the floor and two years in the drawing room. For the young man who is not very practical two years in the shops will not be sufficient, but if at the expiration of that time he has made no material progress, he is probably in the wrong business, and therefore should not be considered.

On a large system the apprentice can pass from the drawing room to the testing department, and thence to the work for which he seems most adapted, and on such a road the time in the drawing room could probably be reduced one year to advantage. It seems probable, however, that on a system of medium size the opportunities for the special apprentice are the greatest. After a few months' experience at the table he should be competent to take charge of the drawing room, and while outlining the work of that department look after all the testing.

Some good authorities hold that two years in the drawing room is excessive, but the chief draftsman on a road of medium size can do much more, in fact, if he is a suitable man. He will have all pattern work to look after and will combine with his other duties that of testing all materials.

Frequent trips about the shops will make him familiar with every detail, and no opportunity for improving shop methods or cheapening cost of production should be overlooked. The keen student will also note a good foreman, and by cultivating a close acquaintance learn much regarding the handling of men. In the selection of every new machine and its location as well as in the re-arrangement of old machinery, the apprentice should be considered.

The installation of new machines should be carefully watched if not supervised, by the special apprentice during his term in the drawing room, so that he may see the practical results of his work and possible difficulties met with in the shop.

In the designing of new equipment exceptional opportunities are offered for an expression of ideas, and as chief draftsman the special apprentice has an unlimited field in which to put himself forward, and for all good ideas he should receive due credit.

In connection with the testing there should come work on the road, and every opportunity given for practical lessons regarding the many perplexing positions in which men find themselves and the adverse conditions under which both men and locomotives are frequently worked. In the office, make him a part of the organization and keep his interest alive by adding to his responsibilities as fast as he shows himself competent.

For remuneration the rate for the first year 15 cents per hour; the second 20 cents per hour; the third 22½ cents per hour, and the fourth 25 cents per hour. For the really competent young man the latter rate is not sufficient; in fact, it is perhaps unwise to fix any special rates whatever. Compensation must be in proportion to the work done and will adjust itself accordingly.

The work in the car department should be closely followed by the special apprentice, especially after reaching the drawing room, for the assistant to the head of the mechanical department naturally assumes the care of the rolling stock.

On a large road the step from testing department to Mechanical Engineer's office is a short one; on a smaller road the special apprentice may readily pass from the drawing room to the position of Assistant Superintendent in the mechanical department.

President D. Van Alstyne (*Chicago Great Western*).—It seems evident to me that no one man can cover the entire railroad mechanical field; that is, he can't get practical experience in the entire mechanical department, if he expects to make any progress within a reasonable time, so that it is necessary that he should, it seems to me, get the practical experience, in the parts that he can least learn by observation, and the balance by observation. There is the firing and the running, roundhouse work, the car work, and all the various branches of engine work, and unless a man spends pretty nearly a lifetime at it, he could not get practical experience in all these departments. If he is to progress to an official position within a few years, as he expects to and hopes to by reason of his education, then he must of necessity learn a good deal of that through observation, and get his practical experience where it could least easily be learned by observation.

Prof. J. J. Flather (*University of Minnesota*).—When it comes to putting in two years in the drawing room I think it is about one and one-half years too much. Give him six months in the drawing room when he has got through with the shop and roundhouse. We are not making a railroad mechanical engineer or railroad mechanical superintendent out of him; he is merely a special apprentice.

Therefore, instead of having four years, two years of which are to be spent in the drawing room, make it three years, not four years. When you come to consider that a man has already spent four years in the high school, and four years in college, why spend four years more, making it 12 years after he leaves the grammar school before he is good for anything? Now practically all of our roads throughout the country know that the boy is good for something after he has been there a year, after two years he is good for a great deal more, and after three years you will find a good many mechanical engineering graduates occupying responsible positions.

The trouble to-day is to get young fellows to do this work. You cannot keep such men at 22½ cents an hour the third year and certainly you cannot the fourth year. It is to the interest of any road to develop the special apprentice, but you cannot secure good material nor can you retain good men unless you make them reasonably contented; and this I believe will not be secured with a four years' course nor a too meagre compensation.

Mr. H. A. Fergusson (*Chicago Great Western*).—Probably the best developed school for special apprentices in the country is the Pennsylvania Railroad's at Altoona. The course there is, first, about six months in the erecting shop. Then the machine shop and vise work for six or eight months longer. They usually then go into the roundhouse for six months or sometimes a year. Then they put him in the car shops for a while. Then they go into the mechanical engineer's office on a drawing board. Then they go to the testing department and are supposed to stay there six months. The testing department is not merely testing materials as much as it is working on coal trials and on the road and going out to manufacturing plants and inspecting materials which are being furnished under specifications.

From there they are now given a course in motive power accounts. They go into the shop clerk's office and learn something about motive power accounts and store orders and material distribution, and work of that kind. Then from there they are liable to be made assistant foreman of some shop. They have the option of firing on the road or not. Usually the man takes it and fires a locomotive anywhere from three to six months. That is generally the last thing he does.

*Abstract of a paper presented to the Northwest Railway Club, Dec. 9, 1902, by Messrs. T. A. Foque and T. Roope.

Long-Distance Electric Railroading.*

BY LOUIS DUNCAN, PH. D.

The problem of substituting electricity for steam on the trunk lines of the country is of such present importance, the efforts being made to solve the problem are so serious, the difficulties are so great, and the results so meagre, that a general review of the subject cannot be without interest. The application of electricity to traction, which I will discuss this evening, may be included under three heads:

First.—Tramways;

Second.—Suburban and interurban roads;

Third.—The field at present occupied by steam locomotives.

In the first two of these applications, the problems presented are practically the same, although the scale of operation is varied. In either case, it is required to operate a considerable number of single cars, or single motor cars and trailers, at frequent intervals. In the third application, however—i.e., in the field now occupied by steam locomotives—the problem is entirely different. Here the necessities of through passenger traffic and of cheap freight transportation demand a few very heavy trains, and the system must be based on the economical solution of this problem. For tramways and interurban roads a practical and satisfactory solution has been found, although it is possible that more satisfactory methods may be developed. For existing steam roads there is at the present moment no electrical solution which has proved its adaptability.

When we consider steam railroad traffic we meet an entirely new set of conditions. For through passenger service, a single car, or even two cars, are not enough to give the comfort to which the traveling public is accustomed. This requires heavy trains consisting of a number of cars. Even for a certain class of suburban traffic, where a large amount of travel is concentrated at certain hours, heavy trains must be used, and a large amount of power utilized for each train.

As far as freight is concerned, the great development in railroads in the past 20 years has been in the direction of increasing the size and capacity of the cars and the weight of the train. For freight, especially bulk freight, the minimum of cost is attained with the maximum weight of train.

*From the *Technology Quarterly*, December, 1902.

The annual reports of the more important roads show clearly the tendency to heavier cars and trains for freight. The average train load on the Pennsylvania Railroad has increased in 20 years by about 75 per cent. and the capacity of the cars is over 100 per cent. greater.

Under these conditions, 500 to 600 volts continuous current motors, receiving current either directly from a central station or from sub-stations, are not applicable. The possibilities of congestion of traffic, especially of freight congestion, make the capacity of sub-stations enormous as compared with the average power required on the line, and there is required in addition an immense amount of copper for the feeders.

Another difficulty is in the large amount of switching to be done, much of it of a complicated nature. If electricity is to be used in terminals and freight yards, a locomotive must be designed which is economical at all speeds and which is under perfect control, and current must be supplied to these locomotives by some means which will not endanger the lives of the train hands. Railroading is dangerous enough as it is, and any additional source of danger must be avoided.

To obviate these difficulties, several plans have been proposed. The first is to use alternating current motors on an electric locomotive, the locomotive to be supplied with high potential currents directly from the generating station, these currents to be applied at once on the motors or to be reduced by transformers carried on the locomotive. A modification of this is to generate a very high potential at the station and to reduce it to a lower potential by means of static transformers along the line, and to use this lower potential on the locomotive. These plans obviate the difficulty of the rotary transformers that would be needed for changing an alternating to a continuous current, and are cheaper in this way. The alternating current motors also allow higher potentials to be used on the motors, so that it would be possible, for instance, to generate at the station 20,000 volts and transform along the line to 3,000, and apply the 3,000 volts to the motors.

To apply this system practically, there have been a number of experiments made, and some roads are operated on this basis. One method that has been used—the only alternating method now in commercial operation—is to supply three-phase currents either directly to the motor or to reducing transformers which are connected to the trolley wires and are carried on the car. As a rule, this system is installed by using two trolley wires above each track, the rails being taken as a return. A number of small mountain roads in Switzerland and one road in Italy are operated on this basis. I will refer to them later.

Another method that has been proposed several times and is being experimented on by the Oerlikon Works in Switzerland, is to use a single phase alternating current motor on the locomotive, connected to a continuous current dynamo, the current from the dynamo to be used to run continuous current motors on the axles. The regulation of the locomotive is obtained by varying the strength of the field of the continuous dynamo.

Still another method, proposed by Mr. Arnold, is to use a single-phase alternating motor, which, when working at normal power, will run the train, when running below normal power will store up air in a receiver, and when more than normal power is required, both motor and compressed air are used.

A further plan just proposed by the Westinghouse Company, and which is being installed on a road between Baltimore and Washington, is, in many ways, the simplest of all. It is well known that a series motor will run on an alternating current circuit, the alternations in the field and armature occurring together, the effect being, under certain circumstances, much like that of continuous current. The Westinghouse Company proposes to take a motor like an ordinary street car motor, to laminate the entire magnetic circuit, so that there will be little waste due to the alternations of the field, and to supply this with alternating current of $16^2/_3$ periods. The characteristics of such a machine are very similar to those of the present continuous current type of series motors, while its regulation is easily effected without breaking the circuit by introducing a variable E.M.F. either working with or against the impressed E.M.F. This variable E.M.F. depends on the position of the armature of an auxiliary transformer in the circuit.

To take these methods up in more detail—the three-phase system has been, as a rule, advocated by European engineers. At first glance it presents a number of advantages over continuous current systems, and it has been practically operated in Switzerland. It has not met with any favor in this country, and its achievements on the other side have not been such as to inspire any great hope of its ultimate success. The roads in Switzerland show practically nothing except that a three-phase alternating motor can drive a car—a thing which was very well known before. There is no railroad problem involved in their operation. The cars are small, and the voltages used are in no case above 750 volts—the limit imposed by the Swiss government.

The most ambitious three-phase road is one in Italy, running from a point a few miles out of Milan, called Lecco—a total distance of 60 miles. A particular interest attaches to this because the system is that of the Ganz Company, which was strongly recommended by English engineers for the Yerkes tunnels in London. The position of the English engineers in this matter was

warmly opposed by Mr. Yerkes and some American engineers, and an ordinary system, very similar to that used on the elevated roads in Boston, New York and Chicago, was adopted. It seems that very few experiments had been tried on the Ganz three-phase system before this discussion came up, and the road in Italy embodies most of the features that were to appear in the London project. The Lecco road was to have started a year ago the first of September. I was on the road the first of this September, and it was then in commercial operation; an experimental car made trips over a part of it.

Roughly, the system is this: Power is generated at a waterfall in about the middle of the line, and is distributed at 20,000 volts to sub-stations where it is reduced to 3,000 volts by static transformers. The overhead system consists of two wires over each track, the tracks acting as a return for the third leg of the circuit. The current is collected by a trolley consisting of two metallic rollers about 2 ft. long, mounted on a wooden axle. The rollers are separated from each other by about 6 in. of treated wood. The roller is held against the trolley wires by compressed air. There are four motors on a car—two of them for permanent use; the other two are merely used in starting. In starting, the fields of the secondary motors are put in series with the armatures of the permanent motors, and a water resistance is put in the armature of the secondary motors. This water resistance is quite ingenious, and will possibly some day work very well, although they have had a great deal of trouble with it up to the present. The plates through which the current passes are stationary; the liquid is forced by compressed air into the tank which contains the plates, and the resistance decreases as the immersed surface increases. When a certain train velocity is reached—which is approximately at half the full speed of the car—and the entire resistance is cut out, the circuits are broken, the secondary motors are cut out, and the permanent motors are put across the supply circuit, with the water resistance in the circuit of the permanent armatures. Then this resistance is gradually cut out as before.

I have not time to go into the difficulties that the Ganz Company has had with this road, but that they are serious is shown by the fact that they are over a year behind the proposed date of opening. The service required is not the heavy service that we need in our railroads, and if it was, the great uncertainty of operation that has been shown would make the system impossible of operation. A great difficulty—in fact, almost a fatal difficulty—with such a scheme is in the liability of trouble with overhead wires. A two-track system, with four wires overhead, these wires having a great difference of potential between them, is almost certain to cause trouble even on a straight track, and where there is switching, the complication becomes enormous.

There is another difficulty of a more technical nature, which depends on the unbalancing of the circuit due to the rail return. I will not discuss this any more than to state that it decreases the normal capacity of the motors—i.e., for a given output they heat more than they should.

It is interesting to note that very close to this road, running about 80 miles out of Milan, is a road equipped by the General Electric Company. The railroad problem is the same in both cases. The General Electric Company finished their road over a year ago, before the time it was promised, and it has been operating successfully ever since, in fact, its service goes beyond the guarantees that were given.

Taking up the system of the Oerlikon Company, it has some advantages in that it requires but little trolley wire over the track, and affords an excellent means of regulating the motors. Its disadvantages lie in the fact that it interposes between the trolley and the motors a transforming station which is not only expensive, but adds greatly to the complexity of the system. For heavy railroad work, between this and the three-phase system, I would unquestionably choose the Oerlikon method.

Mr. Arnold's proposition has yet to be tried. It affords an ingenious, if doubtful, solution of the railroad problem, but I am very much afraid that its complexity will prevent its adoption. Without going into any particular reason why, it does not sound like an operative system.

The Westinghouse system promises much in the way of simplicity and applicability to the heavy problems of steam railroad traffic. A series motor has the advantage that it is to a certain extent self-regulating. If a great torque is required, the armature slows down, the field is strengthened and the maximum effect is obtained. The details of the apparatus have not yet been given out by the Westinghouse Company, but the fact that they have experimented for some time past in their own yards, and have closed a contract for an equipment, shows that they thoroughly believe in its success. One disadvantage is in the low period, which will require large static transformers; but if this is the only difficulty, we can afford to overlook it.

To sum up; as far as the substituting of electricity on steam roads goes, our present methods of electrical traction are not applicable. No method has yet been in successfully practical operation that solves the problem, but our most brilliant experts, having already solved the problem presented by tramway and interurban traction, are seriously attacking the field. The steam railroad companies are becoming interested in the matter, and are lending their co-operation, and we may expect the same results that have been obtained in the past, i.e., that the problem will be solved, and satisfactorily solved.

TECHNICAL.

Manufacturing and Business.

The Sherwin-Williams Co., makers of paints, has increased its capital stock from $1,500,000 to $2,500,000 to provide for the rapidly growing business.

C. A. Reading, of St. Louis, Mo., has succeeded John E. Cox, resigned, as Superintendent of the Indianapolis branch of the American Car & Foundry Co.

George W. Bard has resigned as Vice-President of the Diamond State Steel Co. at Wilmington, Del., to become President of the Salisbury Steel & Iron Co. at Utica, N. Y.

The Carlyle-Johnson Machinery Co., with a capital stock of $100,000, has been formed at Youngstown, Ohio, to make tools, etc. The incorporators are M. Carlyle Johnson, George W. Upton, John Stambaugh, H. H. Stambaugh and H. M. Robinson.

The Southern States Construction Company has been incorporated in New Jersey with a capital stock of $500,000, to do general construction work and bridge building. The incorporators are Frederick K. Sewark, Carl H. Fowler and Kenneth K. McLaren.

The Hedden Iron Construction Co. has been incorporated in New Jersey (Jan. 9), with a capital stock of $100,000, by Eugene B. Hedden, Wm. A. Kinsey and Ernest A. Barker, to make iron and steel structural work for bridges, and do a general construction business.

The National Hoisting Engine Company has been incorporated in New Jersey (Jan. 12) with a capital stock of $100,000, to do a general machine manufacturing business in Newark, N. J., or elsewhere. The incorporators are Colin Campbell, Richard Bowles and Russell M. Everett, all of Newark.

The Brown & Zortman Machinery Company, Pittsburgh, has bought the plant and machine shop equipment of the Hope Manufacturing Company, Park Way, Allegheny, which it will use as a repair shop and warehouse. The company is placing on the market a line of improved axle lathes and universal saw tables.

The Equitable Building, Boston, which was partially destroyed by fire on Jan. 9, will be entirely rewired by Sargent, Conant & Co., electrical engineers and contractors of that city, who began making temporary connections within 20 minutes after the fire was under control. This company, whose old offices were entirely gutted, was transacting business in new quarters with a complete office equipment, telephone service, etc., in less than 24 hours after the fire was out.

Among recent orders for cranes taken by the Northern Engineering Works, Detroit, are the following: Three 70 ft. span electric traveling cranes for Oil Well Supply Co.; one 55 ft. span for Saginaw Plate Glass Co.; three 40 to 50 ft. span electric traveling cranes for Great Lakes Engineering Works; one 10 ton 40 ft. span for Detroit Foundry Co.; besides a number of smaller electric and hand power traveling and jib cranes. They also report the recent sale of three electric cranes for export to England, and one for India.

The annual convention of the Southern Supply & Machinery Dealers' Association will be held in New Orleans from April 8 to 10, inclusive. The St. Charles Hotel will be headquarters. C. B. Carter, the Secretary-Treasurer of the Association, whose headquarters are at 117 Gay street, Knoxville, Tenn., adds the following statement to the official notification: "The growth and development of our organization has been very satisfactory; in fact, the interest and enthusiasm displayed by the supply and machinery dealers and their manufacturing friends has been most remarkable, and the success of the organization is now assured. When it is considered that our organization is as yet less than one year old, we can well flatter ourselves as to the ultimate importance and efficiency of the organization."

Iron and Steel.

The Southern Iron Committee has decided to make a ton of iron consist of 2,240 lbs. instead of 2,268. The new weight will become effective on Feb. 1.

The bridges which the Rutland Railroad expects to build this year (1903) were contracted for nearly a year ago. No new contracts are being considered.

According to reports at the time of going to press, the number of shares applied for by employees of the United States Steel Corporation will greatly exceed the number allotted for distribution.

The Russian Minister of Finance, in the course of a report on the mining industries of the Empire, states that the cost of pig iron in 1903, in Russia, will be less than it is in England and the United States. It is expected that 1,435,000 tons of iron will be made during the year.

Application has been made to the Courts at Buffalo for the voluntary dissolution of the National Tube Works of that city and the appointment of a receiver. The assets, including plant, are given as $213,341 and the liabilities as $708,725. The stringency in the money market has had the effect of preventing the company from floating a bond issue authorized by the directors.

Discussion on Car Lighting.

At a meeting of the New England Railroad Club held on Tuesday, the 13th inst., the subject of car lighting was considered and papers presented as follows: E. F. Slocum, of the Safety Car Heating & Lighting Co., read a paper on the Pintsch system; Arthur Earnsworth, on the Consolidated Axle Light system; Mr. Gilson on the Adams & Westlake Acetylene system, and Mr. Fisher, on the Commercial Acetylene system. A paper was also presented on the use of the De Laval steam turbine for generating current for electric train lighting. The discussion, though not long, was spirited, and referred especially to the economy and safety of Pintsch light and the dangers attendant upon the use of acetylene for car lighting purposes.

The Great Lakes Engineering Works.

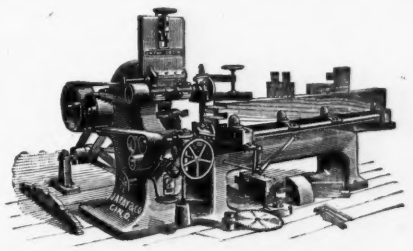
The Great Lakes Engineering Works has plans made for its large ship yard and floating dry dock to be built at Detroit, and has increased its capital stock to $2,000,000. These extensions follow a successful half-year's operation by this company which was organized last summer and took over the engineering works of S. F. Hodge & Co. The company has 85 acres, with a frontage of 1,200 ft. on the Detroit River, and the tract is reached by the Michigan Central and Detroit Southern Railroads. The floating dry dock will be 500 x 110 ft., of 5,000 tons capacity, and 18 ft. over blocks, making it the largest of the kind on the Lakes. The designers are Clark & Stanfield, of England. The buildings at the yard will consist of the following: Plate and shape shop, 150 x 300 ft.; furnace shop, 70 x 100; joiner shop, 50 x 140; warehouse, 100 x 100; forge shop, 55 x 60; power plant, 99 x 100; yard repair shop, 50 x 60; pipe shop, 50 x 60; sheet metal shop, 50 x 60; paint shop, sawmill and tool room, each to be 40 x 50; riveting shop, 20 x 40, and offices, 40 x 90. All machinery will be driven by electricity. The riveting, coultering and reaming tools will be operated by compressed air, there being two air compressors of 3,000 ft. capacity for this purpose. Antonio C. Pessano is President and General Manager; John R. Russel, of the Russel Wheel & Foundry Co., Secretary and Treasurer.

Contracts for machinery and buildings so far let are:

Electric traveling gantry cranes for handling materials over the building berths, Wellman-Seaver-Morgan Engineering Co., of Cleveland; 10-ton traveling locomotive cranes to the Industrial Works, Bay City, Mich.; punches, shears, plate planers to the Cleveland Punch & Shear Works Co., Cleveland; bending rolls and boilers to Wickes Bros., Saginaw, Mich.; all the steel for buildings to the Russel Wheel & Foundry Co., of Detroit, Mich. The engines and vertical air compressors are being built by the Great Lakes Engineering Works in their engine shops, and the floating dry dock will also be built by themselves and will be entirely of steel construction. Overhead traveling cranes in the plate and angle shops will be furnished by the Northern Engineering Works, of Detroit.

New Car Shop Tenoner.

One of the most powerful tenoning machines ever built is here shown. It will do single, double or triple tenoning, and also cut-off and gain, to the very best advantage, and by adjusting the gaining heads in different ways, will over and under-gain, and cut on any portion of the timber desired. By removing the lower cutter head and substituting a circular saw, heavy cutting-off



can be readily done; the upper and lower tenoning heads have knives that will tenon up to 6 in. in one operation, or by repassing the material, tenons of any length can be cut very easily. The upper head can be adjusted to make one tenon longer than another. The carriage is self-acting, and can be made to travel in either direction or instantly stopped by pressure of a lever; on heavy work power feed is preferable, while on short the carriage can be disengaged and operated by hand. The machine is made by J. A. Fay & Egan Co., Cincinnati, Ohio.

To Tunnel Under the Seine.

A Paris despatch says that the scheme of M. Berlier, an engineer, for tunneling under the mouth of the Seine has been adopted. The tunnel, which is designed to give railroad connection between Havre and Pont Audemer, will be 3,000 yards long and will be 17 ft. below the river bed. It will carry a double track. It is estimated that the work will be finished in three years and cost about $6,250,000.

Some Foreign Electric Railroad Contracts.

The British electrical engineering and contracting firm of MacCartney, McElroy & Co. (New York office, 26 Cortlandt street), is in the market for equipment for an electric railroad system to be built at Lorenzo Marquez, Portuguese East Africa. The road will be about 15 miles long and probably most of the material will be bought in America.

Robert W. Blackwell & Co., Ltd., London, are also about to buy considerable overhead equipment for an electric railroad for the Burton-on-Trent and Leicester Municipal Electric Traction Companies. The first named

contract requires about five miles, and the latter about 14 miles of work. Part of the equipment will be bought in the United States.

A municipal electric lighting and traction system is to be built in Rangoon, Burmah, and it is said bids will soon be wanted.

The N. & C. Taylor Company.

H. H. Dickey, in the interests of the N. & C. Taylor Co., has bought A. F. Baumgarten's entire interest in both the Maryland Sheet & Steel Company and the Maryland Rail Company, of Cumberland, Md., and at the election of officers held last week H. N. Taylor, of N. & C. Taylor Co., Philadelphia, was elected Vice-President of the Maryland Sheet & Steel Company, and Lewis C. Millholland was elected Vice-President of the Maryland Rail Company in lieu of Mr. Baumgarten.

A Car Wheel Works For Montreal.

The Montreal Car Wheel Co., of which Thomas J. Drummond is the President, has decided to rebuild the car wheel works at Lachine which were destroyed by fire some time ago. The plant is near the Dominion Bridge Company's works.

The Worden-Allen Company.

The new bridge shop at Milwaukee, Wis., will be built by the Worden-Allen Co., consulting and contracting engineers and manufacturers of steel structures. The company is now negotiating with the city authorities for a suitable site on which to build. The main shop building will be 240 ft. x 70 ft.; the machine and blacksmith shop additions will be 30 x 60 ft.; the power house will be a separate building, the size of which has not yet been determined. The capital is $100,000. Beverly L. Worden is President; F. H. Bottum, Vice-President, and Clarence J. Allen, Secretary and Treasurer.

Track Bolts With Rolled Threads.

The American Bolt Co., of Lowell, Mass., and the Southern Bolt & Nut Co., of Birmingham, Ala., have consolidated under the name of the American Bolt Co., Inc., and the new company now is building two large buildings at East Birmingham, Ala., where it will carry on a general business of making bolts, nuts, lag screws, track bolts, railroad spikes and heel bolts, and all kinds of building material. An officer writes that a specialty will be made of track bolts by an improved method, these being made with a rolled thread. W. H. Merritt, heretofore the owner of the Southern Bolt & Nut Co., will be the General Manager of the new concern.

The American Structural Steel Co.

In our issue of Jan. 9 we said that the Pittsburgh Structural Steel Co. was forming to engage principally in structural work. J. F. Joyce, of the Columbia Fire Proofing Co. of Pittsburgh, writes that the concern will be known as the American Structural Steel Co., and the plant will be built at East Carnegie, Pa. The main building will be 90 x 250 ft.; the office and drafting rooms each 30 x 40 ft. There will be a stock yard covering about three acres. The annual capacity of the plant will be about 15,000 tons of steel for buildings. The other persons interested are C. L. Ralph, Geo. W. Miller, H. B. Cidle, Geo. V. Milliken and others, representing in all about 20 concerns engaged in making building material or in erecting large buildings.

Contracts For New Cruisers.

The Naval Board on Construction, after an examination and consideration of the bids for the armored cruisers "Tennessee" and "Washington" opened on Jan. 6 and noted in this column last week, has recommended that the bid of William Cramp & Sons, of Philadelphia, to build the two ships at $4,000,000 each, one to be completed in 36 and the other in 39 months, under the modified plans and specifications of the Navy Department, be accepted, as the features in the builders' plans which are objectionable admit of satisfactory adjustment and the bid of Cramp & Sons is the lowest and promises delivery in the shortest time. The Board recommends that the electrical generating plant specified by the Department be used at an additional cost of $35,000 for each ship, and acting under the advice of Rear-Admiral Melville, Engineer in Chief, the Board also recommends that Babcock & Wilcox boilers be insisted upon as specified in the plans of the Navy Department, instead of the boilers named in the Cramp bid.

Bids For Gun Forgings.

Rear-Admiral Charles O'Neil, U. S. N., Chief of the Bureau of Ordnance, has received bids from the Bethlehem Steel Co., The Midvale Steel Co. and the Crucible Steel Co. for steel forgings for one 13-in., two 12-in., six 6-in., eight 5-in. and eight 4-in. guns. Each maker fixed the price at 21 cents a pound except for one of the 12-in. guns to be made of nickel steel, for which the bid is 30 cents a pound. The Crucible Steel Co. bid only on the smaller guns. As the three companies average up equally even on the time of delivery, it is probable that the work will be divided amongst them.

The Piper Friction Draft Gear Co.

Col. J. M. Schoonmaker, Vice-President of the Pittsburgh & Lake Erie Railroad, will be President, and B. C. Vaughn, assistant to Col. Schoonmaker, will be Secretary and Treasurer of the Piper Friction Draft Gear Company, which has recently been incorporated in Pennsylvania. The company will have an initial capital of $50,000. For the present the draft gear will be made by a New York supply manufacturing company under a contract, but later a plant will be erected by the Piper company in the Pittsburgh district. The Piper friction draft gear was described and illustrated in the *Railroad Gazette*, June 13, 1902, page 433.

Patent Office Changes.

Mr. William J. Rich, of Massachusetts, has been appointed a Principal Examiner in the Patent Office to succeed the late Prof. Francis Fowler, and Examiner Granville Lewis has been placed in charge of the Division of Steam Engineering.

THE SCRAP HEAP.

Notes.

According to western newspapers the Northern Pacific is adopting the telegraph block system on some of its divisions and will, within a month or two, have it in operation throughout its main line.

On Sunday, Jan. 4, the movement of freight over the lines of the Lake Shore & Michigan Southern was the heaviest for a single day in the history of the road. The total number of cars moved was 13,583. In the first seven days of January the total number of loaded cars moved was 7,603 more than in the corresponding period of 1902.

Floods in the Cascade Mountains the first week in January caused very extensive damage to the Northern Pacific and the Great Northern Railroads, and the interruption to traffic has been serious on both roads. A despatch from Tacoma, Jan. 8, said that the Northern Pacific would be closed to traffic for at least two weeks. The section requiring the most work to restore was along the Green River in the Eagle Forge Canon. Passengers in some of the trains which were stalled by the floods were kept in the cars for a number of days.

Mr. C. R. Barnes, Inspector for the New York State Railroad Commission, has made a report on a recent accident on the Albany & Hudson (Electric) railroad in which he recommends (1), that when two or more motor cars are run in a train, the motorman of the foremost car shall have control of the power and the brakes on all of the cars; (2), the use of a rule requiring operators and agents to enforce the time interval between trains; (3), that operators be relieved for meals, and that all telegraph offices should be manned while trains are being run; (4), that all employees be examined at once on the general rules and that the examinations be made every month.

A press despatch from Washington says that the Interstate Commerce Commission has sent to the House of Representatives a communication calling attention to the recent decision of the Federal Court on the Safety Appliance Law, reported in the *Railroad Gazette* of Jan. 2, page 10, in which certain deficiencies in this law are pointed out. The Commission states that if this decision is sustained by the Supreme Court the effect will be to nullify the purpose of the statute in an important respect, "which is to secure such uniformity in applied automatic coupling devices as to permit all the cars in a train to be coupled and uncoupled without requiring men to go between the cars."

Traffic Notes.

A trainload of wholesale merchants of Memphis are going to take a trip, which will last a week, along the line of the Illinois Central, between that city and New Orleans, for the purpose of establishing more intimate relations with retail merchants. The excursion will start on Feb. 4.

Mr. Bacon, the representative of western merchants who is working for the proposed law to enlarge the powers of the Interstate Commerce Commission, says that the Senate Committee has voted to make a favorable report on the Elkins bill; but there are some modifications to be made in it before it is sent to the Senate.

On one Sunday recently the yards of the two principal railroads in Winnipeg contained 644 carloads of cord wood, which the agents appear to have been unable to deliver on account of a glut in the market. As an item of traffic news this paragraph may not, perhaps, be of great interest outside of Manitoba; but it may make pleasant reading for some readers farther South who are particularly interested just now in the fuel question.

According to western papers the chief officers of the roads west of Chicago have pledged themselves to be personally responsible for the strict maintenance of tariff rates on freight and passengers. These pledges were voluntarily given at a recent meeting of the executive officers of the principal lines. Local committees composed of the chief traffic officers of the different roads have been appointed to investigate charges of rate cutting and to act upon each recommendation or request for a change in rates. No reduction in rates can be granted under the new agreement or free transportation given to influence traffic without the sanction of these committees. The committees will have their respective headquarters in Chicago, St. Paul, St. Louis and Kansas City. The effort to discontinue the multitude of commodity rates that have been in force for the past year is still kept up.

The Proposed Department of Commerce and Labor.

The Committee on Interstate and Foreign Commerce of the House of Representatives last week favorably reported to the House the bill establishing a Department of Commerce and Labor, the bill having been considerably changed since its passage by the Senate last session. The report accompanying the bill says that one object of the proposed new department is to consolidate all of the statistical bureaus of the Government in one department and to place in it all the scientific bureaus which work in relation to commerce, manufactures and labor. The bill as reported transfers to the new department the Light House service, National Bureau of Standards, Coast and Geodetic Survey, Bureau of Immigration, Bureau of Statistics, Chinese Immigration and Alaskan Fisheries, from the Treasury Department; the Bureau of Foreign Commerce, from the State Department; the Permanent Census, from the Interior Department; and places in the new department the Fish Commission and the Department of Labor. Three new bureaus are also created in the proposed department, viz., Manufactures, Insurance and Corporations, and the President is authorized to transfer to the new department any branch of the public service which does statistical or scientific work. The new Bureau of Corporations is intended as the means by which the executive branch of the Government shall carry into effect proposed legislation on trust combinations; the Bureau of Manufactures is intended to foster the various manufacturing industries of the United States and markets for the same. It is understood that labor organizations and leaders will most actively oppose including the Department of Labor in the new department, as they feel that there should be an independent Department of Labor presided over by a cabinet officer, the prospect for which would be more remote if the present Labor Bureau is placed in the new Department of Commerce.

Fuel Oil on the Southern Pacific.

A despatch from Austin says that the Southern Pacific has made additional provision for its future oil supply by purchasing 800 acres of oil land in the heart of the new Saratoga field in Texas, including three producing oil wells. The price paid for the property was $240,000. The Southern Pacific has extensive oil land holdings in the Sour Lake fields which promises to excel the Beaumont field in point of area and productiveness. It is also stated that the same company has acquired large holdings in the oil fields at Jennings, La. It is understood that the storage tanks of the company situated at various points on its line between New Orleans and San Francisco are filled and that it has constantly on hand more than two million barrels.

Heavier Rails for Prussian Railroads.

Under date of Dec. 11, 1902, Consul-General Richard Guenther writes from Frankfort: The management of the Prussian State railroads commenced, a few years ago, to strengthen the roadbeds of the most frequented lines and to replace the 72½-lb. rails with those weighing 92.4 lbs. This, however, was done only where the old rails were worn out. It has now been determined to change the roadbeds and rails of the main lines at once, without reference to the condition; the number of ties will also be increased. It is argued that while this change will require a good deal of capital, it will in the end be economical, as the heavier roadbeds are more easily kept in repair. The Minister of Finance has approved the plan, and the German industries and working people are greatly pleased over the prospects of increased opportunity for work, in these days of business depression.

Metropolitan Street Railway.

Beginning with Jan. 18, there will be an increase of 5 per cent. in the wages of motormen of all classes, and of conductors who have served five years in the Metropolitan Street Railway Company of New York City. The last increase was made in June, 1901. This new increase will make the wages of this company about 85 per cent. higher than the European average.

Orient Road to Operate Boats.

The Kansas City, Mexico & Orient Railroad has contracted for two steamboats to ply between ports on the Pacific coast of Mexico. They are to fly the Mexican flag.

Canadian Steel & Coal Company.

The Colonial Securities Co. of New York, has got out a pamphlet describing the prospects of this company, which owns 9,600 acres of coal property known as the New Campbellton Colliery, at Bras d'Or Bay, Cape Breton. This property is in full operation, with full equipment, and is producing and marketing 300 tons of coal a day at a profit of about $1.00 a ton. The prospectus also shows that the company owns 4,000 acres of iron ore near the mouth of the River Natashquan, situate on the north shore of the Gulf of St. Lawrence, in the County of Saguenay. The prospectus fails to show, however, where the company intends to build its steel plant, but it is understood that it will be on Anticosti Island, in the Gulf of St. Lawrence, just north of Nova Scotia. The capitalization is to be $1,000,000 preferred, and $5,000,000 common.

Rapid Transit in New York City.

Wm. Barclay Parsons, Chief Engineer of the Rapid Transit Commission, has said that he has been assured by the Subway contractor that the underground trains would be running by the early part of next autumn. The work has so far advanced that it is quite probable that trial trains are to be worked on some sections as early as June. It is said that the building of the station at 104th street, which has caused much discussion of late, will delay the opening of the East Side branch for about six months.

Railroads in the Philippines.

The U. S. Senate last week passed a resolution asking the Secretary of War to inform the Senate as to the effect of a system of railroads in the Philippine Islands in maintaining law and order. And an amendment offered to the Army appropriation bill provides for the construction, equipment and operation by the Secretary of War of railroads in those islands for the purpose of protecting life and property and maintaining a stable government, not less than 300 miles of road to be built each year for ten years.

Traffic at a Loss.

In a recent public discussion in London Mr. Gibb (General Manager of the North-Eastern), said: "I do not hesitate to say that in regard to a certain percentage of the goods traffic conducted in this country, it is carried at an actual loss; and I am not afraid to say so, because I believe that if fuller information were in the possession of those critics who give their attention to these subjects, and in the possession of the traders of the country, who are a business-like and sensible body of men, they would not hesitate to draw the proper conclusions." In the old, bad and unscientific days some traffic used to be carried at a loss in this country too.

National Aid To Good Roads.

A bill has been introduced in Congress by Representative Brownlow, of Tennessee, to provide for a system of national, State and local co-operation in the permanent improvement of public highways. In substance, it authorizes the Treasury to meet one-half the cost of such improvements to highways, not in a city or incorporated

village, as a duly appointed director shall determine to be proper, for the purposes of common traffic and travel, and for the rural free delivery of mail by the United States Government. This duty is to be assigned to an officer who shall be known as the Director of the Bureau of Public Roads to be established in the Department of Agriculture, under the management of the Secretary, with a salary of $4,500, a suitable staff, and an appropriation of $75,000 a year for the Bureau, and of $20,000,000 for the actual building of roads.

The Simplon Tunnel.

The United States Consul at Genoa, Mr. Pearson, writes:

"I have recently made a visit to the Simplon, in order to ascertain the character and progress of this stupendous undertaking, whose success or failure means so much for the future of Genoa. Last March, upon the authority of an American engineer, I stated that such serious obstacles had been encountered in the south side of the tunnel that no progress was being made, and that the location of the line would probably have to be changed. My examination, on the spot, removed all doubts on this score. The work is progressing rapidly in the tunnel on both sides of the Alps; about 4,000 workmen are employed in the tunnel, and not less than 6,000 on the Italian section of the road between Isella, at the mouth of the tunnel, and Arona, the present terminus of the railroad running north from Milan. It is now practically certain that the road will be completed within the estimated time—that is to say, by July 1, 1905—as nearly two-thirds of the tunnel was finished on July 1, 1902, and the worst obstacles have already been met and mastered. The greatest of the impediments was the ever-increasing heat in the tunnel. The volume of water flowing out of the south end of the tunnel is over 15,000 gallons per minute, and furnishes motive power sufficient not only to work the refrigerating apparatus, but to compress the air by which the drills are operated. This tunnel, when completed, will be the largest in the world—to wit, 14 miles long, or twice the length of the Mont Cenis and five miles longer than the St. Gotthard. The cost of the tunnel alone will be 70,000,000 francs ($13,510,000), an average of nearly $1,000,000 per mile."

English Notes.

The use of dining cars is spreading very much in England and the Great Northern have just added to their stock two new corridor trains for the London-Leeds-Bradford services. The cars will seat first and third class passengers and are about 60 ft. over all.

The Great Western have also on the first of the new year begun the running of first, second and third class dining cars between Cardiff and London and Bristol and London instead of as formerly only first class. They are also building more cars, which will no doubt be used in the West of England services.

There is building at Belfort an engine for the Great Western on the De Glehn system. It is of the Atlantic type and the dimensions will closely approximate those of the Nord 2.641 class illustrated in the *Railroad Gazette* Oct. 10, 1902, page 769.

There are being constructed at the St. Rollox works of the Caledonian Railway at Glasgow two large six-coupled engines with inside cylinders. These engines are to take the West Coast trains over a controlling grade 10 miles long of 68 ft. per mile. As the trains are often some 300 tons behind the tender and the speed is 50 m.p.h. the work required is considerable and it is not reduced by the frequent necessity of making up time lost by the connecting line south of Carlisle.

The Great Western will open in the spring the new direct South Wales line which will save 10½ miles in distance and about one-half hour in time. This line will avoid Bath and Bristol and will leave the main line some 82 miles from Paddington. It will also avoid three grades and will afford a shorter line to the West as well as the South Wales district. The line has been built with a view to running high speed trains, the curvature is light and the grades are not more than 26 ft. to the mile.

LOCOMOTIVE BUILDING.

The Great Northern has ordered 50 locomotives from the Rogers Locomotive Works.

The Lehigh Valley is reported to have ordered 25 locomotives from the Baldwin Works.

F. M. Hicks has received an order from the Lake Erie & Detroit to rebuild five freight locomotives at the Hicks Locomotive & Car Works.

The Chesapeake & Ohio has ordered 50 G7, simple consolidation locomotives. Half are to be built at the Baldwin Works, and half at the Richmond Works of the American Locomotive Company.

The Chicago, Rock Island & Pacific's order for 225 locomotives, which has been widely reported of late by the press, was placed several months ago, and went to the American Locomotive Company.

The Texas & Pacific, as reported in our issue of Jan. 9, has ordered 15 ten-wheel simple freight locomotives from the American Locomotive Co. These locomotives will weigh 163,500 lbs., with 127,500 lbs. on the drivers, and have 20 x 26 in. cylinders, 63 in. drivers; radial stay extended wagon top boilers, with a working steam pressure of 210 lbs.; heating surface, 2,147 sq. ft.; Pacific brand 280 tubes, 2 in. in diameter, 13 ft. 4 in. long; fire-box of carbon steel 123 in. long and 42 in. wide; grate area, 36 sq. ft.; tank capacity, 6,000 gallons of water and 12 tons of coal. The special equipment includes: Westinghouse air-brakes, Golmar bell ringers, Keasbey & Mattison boiler lagging, Damascus brake-beams, Tower couplers, Pyle-National electric headlights, Ohio injectors, Phosphor bronze journal bearings, U. S. piston and valve rod packings, Coale safety valves, Leach sanding devices, Detroit sight-feed lubricators, Pickering springs, and Gold steam heat equipment.

The Boston & Maine has ordered 20 Mogul freight simple locomotives to be built at the Manchester works of the American Locomotive Co., the date of delivery beginning with May 15, 1903. The locomotives will weigh 136,000 lbs., with 117,000 lbs. on the drivers, 19 x 26 in. cylinders, and 63 in. drivers, extended wagon-top boilers, with a working steam pressure of 200 lbs.; 286 National Tube Co. charcoal iron (B. & M. special grade) tubes, 2 in. in diameter and 11 ft. 8 in. long; fire-box 108$^{3}/_{16}$ in. long, and 40⅜ in. wide (inside measurement) of steel. Tank capacity 4,000 gallons of water and seven tons of coal. Special equipment will include: Westinghouse air-brakes, Carnegie steel axles, Franklin Mfg. Co. boiler lagging, Sterlingworth reinforced brake-beams, M. C. B. cast-iron brake-shoes, M. C. B. Tower couplers, Dewey 17 in. steel headlights, Hancock composite injector, United States Metallic multiangular piston and valve rod packings, Ashton safety valves, Leach sanding devices, American Locomotive Co. springs, American steam gages, Midvale driving wheel tires for 10 locomotives, Latrobe tires for the other 10, Standard steel truck wheel tires, cast-iron tender wheels, cast-steel wheel centers, Westinghouse friction draft gear back of tender, and McCord spring dampeners.

CAR BUILDING.

The American Car & Foundry Co. has miscellaneous orders for 35 cars.

The Louisville & Nashville is having 10 coaches built by the Pullman Co.

The Tacoma Eastern has ordered 30 flat cars from the American Car & Foundry Co.

The Southern Indiana has ordered 2,200 coal, 50 box, and 25 stock cars from Barney & Smith.

The Alabama Great Southern is having 200 freights built by the Georgia Car & Mfg. Co., Savannah, Ga.

The Wabash is having 17 coaches built at the Jeffersonville works of the American Car & Foundry Co.

The Adamson Stock Car Co., 734 Stock Exchange Bldg., Chicago, will place an order for about 500 stock cars this week.

The Buffalo, Rochester & Pittsburgh has ordered 300 coal, 100 box and 100 coke cars from the American Car & Foundry Co.

The Union Tank Line will build 200, 100,000 lbs. tank cars at its shops at Buffalo. Universal journal bearings have been specified.

The Delaware & Hudson has ordered 600 flat, 250 box and 25 fifty-ton steel underframe box cars from the American Car & Foundry Co.

The Kansas City, Mexico & Orient has ordered 300 box, 100 flat, 100 combination and six caboose cars from the American Car & Foundry Co.

The Atchison, Topeka & Santa Fe has ordered 500 stock cars from the Pullman Co., specifications for which were published in our issue of Dec. 12 last.

The Pennsylvania is having 1,100 freights built at the Berwick works of the American Car & Foundry Co., 23 freights at the Cambria Steel Co., Johnstown, Pa., and 200 freights at the Allison Mfg. Co., Philadelphia.

F. M. Hicks, of the Hicks Locomotive & Car Works, has received an order to rebuild 20 flat cars for the Terminal Association of St. Louis. It has sold two first-class coaches, and a private car rebuilt at the Hicks Works for the Carolina & Northwestern.

The Delaware, Lackawanna & Western has ordered 500 steel hopper cars, 80,000 lbs. capacity, from the Standard Steel Car Co. The cars will be 30 ft. long, 9 ft. 5⅝ in. wide and 9 ft. 10 in. high (inside measurement). The cars are to be built of metal with metal underframes. The special equipment includes: Steel axles, cast-steel bolsters, steel brake-beams, cast-iron brake-shoes, Westinghouse brakes, Magnus Metal Co. brasses, Hennessey Friction draft-rigging, Symington dust guards, journal boxes, and journal box lids, Carburet black paint, Standard Steel Car Co. design trucks, and 33 in. cast-iron wheels.

The Illinois Central has ordered 2,000 coal, 2,000 box cars of 80,000 lbs. capacity, and 200 refrigerator cars from the American Car & Foundry Co., for February to May delivery; and 500 box cars of 80,000 lbs. capacity from the Southern Car & Foundry Co., for March delivery. The coal cars will be 36 ft. long and 8 ft. 6 in. wide over sills; the box cars will be 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, all inside measurements. All cars to be built of wood, with wooden underframes. The special equipment for all includes: Common Sense bolsters, Lappin brake-shoes on the 500 box cars, Hewitt M. C. B. brasses, Illinois Central standard door fastenings, Security doors and Gould draft rigging on box cars, Thornburgh draft rigging on coal cars, Ryan dust guards, Woodman journal boxes and lids on coal and 500 box cars, Chicago roofs on box cars, Railway Steel Spring Co.'s springs, and Kindl and Fox trucks.

The St. Louis & San Francisco, as reported in our issue of Jan. 9, is about to order from 10 to 30 coaches, three to six chair, one cafe and three combination mail and passenger cars from the American Car & Foundry Co., for January and February, 1904, delivery. The coaches and chair cars will be 70 ft. long, 9 ft. 10 in. wide over sills, and 6 ft. 10 in. high from top of sill to bottom of plate. The special equipment for coaches and chair cars includes: M. C. B. standard axles, American Car & Foundry Co.'s standard bolsters, Lawler brake-beams, Sargent brake-shoes, Janney couplers, Burrow curtain fixtures, Pantasote curtain material, Safety heating system, M. C. B. standard journal boxes, Fletcher pressed steel journal box lids, Pintsch gas light for coaches, Frisco standard paint, American Car & Foundry Co.'s platforms, American Car & Foundry Co.'s high back seats for coaches, Scott springs, Pullman standard trucks, American Car & Foundry Co.'s standard vestibules and Standard Steel Co.'s wheels. The cafe car will be 70 ft. long, 9 ft. 8 in. wide over sills, 6 ft. 10 in. high between sill and plate and 15 ft. 2½ in. high over all. The special equipment includes: National-Hollow brake-beams, Christie brake-shoes, Forsyth curtain fixtures, Safety heating system, M. C. B. journal boxes and lids, American Car & Foundry Co.'s standard roof, Scott springs, American Car & Foundry Co.'s standard trucks and vestibules and McKee-Fuller wheels. The combination mail and passenger cars will be 70 ft. long over sills. The special equipment has not yet been decided.

BRIDGE BUILDING.

ALABAMA.—On Jan. 6 the House of Representatives passed the bill, which was passed by the U. S. Senate last session, authorizing the Pensacola, Alabama & Tennessee Ry. Co. to build, maintain and operate a railroad bridge across the Alabama River, in Wilcox County, Alabama. (July 4, 1902, p. 542.)

ALLENTOWN, PA.—All bridge contracts pending in the Department of Public Grounds & Buildings at Harrisburg, we are told, have been let with the exception of the one over the Lehigh River at Allentown, and this bridge has not yet been advertised for. The bridge proper is to be about 756 ft. long, and, with approaches, will be over 1,000 ft. T. L. Eyre, Superintendent of the Department.

ARKADELPHIA, ARK.—Bids are wanted Feb. 10 for building the steel bridge over Ouachita River. It will be 514 ft. long, divided into two spans of about 175 ft. each, and two spans of about 80 ft. each. The roadway will be 16 ft. wide. The structure is to rest on tubular steel piers, filled with concrete. Address Joe Hardage, County Judge. (Dec. 26, 1902, p. 990.)

BEAVER, PA.—The bridge across the Ohio River to be built for the Jones & Laughlin Co.'s railroad, will be at Smith's Ferry below Beaver. The bridge will span the river at a height of 165 ft. above low water. Its length, with approaches, will be over 2,000 ft.

BOSTON, MASS.—Conferences are being held between the commissioners in charge of the matter of the East Boston grade crossings, and representatives of the Boston & Maine, the Boston & Albany, and the Boston, Revere Beach & Lynn. The representative of the Boston & Albany submitted a plan to eliminate all the grade crossings at a cost of $1,021,650. The City Engineer of Boston has also submitted a plan to do the same work at a cost not to exceed $1,011,851.

BRIDGEPORT (JACKSON COUNTY) W. VA.—The following bids were received by the county for building the proposed bridge over Wheeling Creek: West Virginia Bridge Co., $34,555; E. J. Landen, $29,500; Vauetz Iron Works, $24,000; Somerville Engineering Company, $21,000, and the Riverside Bridge Company, of Martin's Ferry, $20,999.

COLUMBUS, OHIO.—The form of contract for building the two viaducts in Cleveland avenue over the tracks of the Norfolk & Western, the Cleveland, Akron & Columbus, the Baltimore & Ohio and Pennsylvania Company is about completed, and, according to local report, bids will be wanted pretty soon. The above named railroad companies and the Columbus (Street) Ry. will pay 80 per cent. The work is being done under direction of County Surveyor Henry Maetzel.

EAST PEORIA, ILL.—Bids are wanted Jan. 27 for building the 65-ft. span combination concrete and steel bridge over Farm Creek. R. M. Orr, City Clerk.

FALL RIVER, MASS.—The County Commissioners, acting under instruction from the State Legislature, are considering the matter of the proposed bridge over Taunton River between Fall River and Somerset. Hearings are being given to decide upon the best site for the bridge. Two sites under consideration, one above and one below the present bridge, require a structure anywhere from 960 ft. to 2,000 ft. long, the cost being stated at $500,000, though it is quite probable that the cost will be pretty nearly double this amount.

FLORIDA.—The House of Representatives on Jan. 6 passed a bill authorizing the United States and West Indies R. R. & Steamship Co., of Florida, to build a bridge across Manatee River, in Florida. A similar bill was passed by the U. S. Senate last session. (April 25, 1902, p. 312.)

GEORGIA.—On Jan. 6 the House of Representatives passed a bill authorizing the Wadley & Mount Vernon R. R. to build a bridge across the Oconee River, Ga.

GRAND RAPIDS, MICH.—The Board of County Surveyors are expected to take up the matter of building a highway bridge at North Park at its January session. T. O. Williams, Supervisor, Kent County.

GREENSBURG, PA.—The Commissioners of Fayette and Westmoreland Counties will build a new intercounty bridge over Jacob's Creek at Keister's Mills.

HARRISBURG, PA.—Application is about to be made for a charter to build a bridge over the Susquehanna River, between Maclay street, Harrisburg, and North street, West Fairview. The applicants are Frank Martin, J. W. Wetzel and F. H. Spangler in the name of the West Fairview & Harrisburg Bridge Co.

KINGSTON, TENN.—The Roane County Court is considering building a bridge over the Tennessee River near Kingston. It is also likely that the same court will order a bridge over the Clinch River above Emory Ferry. These two bridges will cost the county about $125,000.

LANCASTER, PA.—The Commissioners of Lancaster County, it is said, will soon want bids for building the one-span steel bridge over Grists Fording. James W. Deller, County Clerk.

LOUISVILLE, KY.—B. F. Avery & Sons propose to build a bridge over the Baltimore & Ohio Southwestern tracks at its plant and has applied to the Railroad Commissioners for permission.

MILWAUKEE, WIS.—Reports state that the Board of Public Works has ordered bids received for the bascule bridge at West Water street, but the City Engineer reports that the plans have not yet been approved by the Government. Chas. J. Poetsch, City Engineer.

The $150,000 bonds for the Jones Island bridge have been sold and the next step in the matter is to ask bids on construction.

MISSISSIPPI.—A bill was introduced in the House of Representatives on Jan. 8 and referred to the Committee on Interstate and Foreign Commerce, authorizing the Pearl & Leaf Rivers Railroad to build a bridge across Pearl River, in Mississippi.

MUSCATINE, IOWA.—Bids are wanted at the office of A. C. Noble, County Auditor, Feb. 3, for furnishing all metal for bridges needed by the county during the year 1903.

PENNSYLVANIA.—The House of Representatives on Jan. 6 passed a bill authorizing the Counties of Washington and Westmoreland, Pa., to build and maintain a bridge across the Monongahela River.

PITTSBURGH, PA.—It is said that the Ohio River Connecting Ry., owned by the Pennsylvania, will increase its capital by $1,000,000, to make the proposed improvements on both approaches to the bridge over the Ohio.

PLAINWELL, MICH.—The concrete bridge proposed at Plainwell by Allegheny County will cost about $35,000. The Board of Supervisors has not yet made any definite arrangements to build. Albert Nichols, of Plainwell, is Supervisor.

RICHMOND, VA.—Following the announcement that Frank J. Gould has acquired control of the electric rail-

roads in and about Richmond, comes the report that Mayo's bridge over the James River will be condemned in order that a new and stronger bridge may be built, on which an electric railroad can be built.

SANDUSKY, OHIO.—The proposed Toledo-Lakeside Electric R. R. proposes to build a bridge across the bay for an entrance into the city. Mark Knabenshue, of Toledo, is reported interested.

SANTA BARBARA, CAL.—The city proposes to build about 12 bridges during the next few months at a cost of about $40,000. They are all to be stone structures replacing wooden bridges. J. L. Moyer, City Engineer.

SAVANNAH, TENN.—A. A. Watson, of this place, writes that Hardin County will build four steel bridges during 1903. Further information may be had by addressing Gus. Whitlow at Savannah; T. T. Watson at Paulks; Ed. Deford, Olive Hill, or Ben Kerr at Savannah.

SCRANTON, PA.—An ordinance is before the Councils providing for a bridge over Roaring Brook at Ash street, at a cost of $6,400.

SIOUX CITY, IOWA.—Local reports state that the city will soon be compelled to put in a new bridge over the Floyd River whether or not the stream is ever straightened. The City Engineer has under consideration plans for a structure to cost $10,000.

TENNESSEE.—On Jan. 6 the House of Representatives passed a bill authorizing the Knoxville, LaFollette & Jellico R. R. to build a bridge across the Clinch River, in Tennessee.

WAVERLY, TENN.—A site has been selected upon which to build another bridge over Duck River.

WEST PLAINS, MO.—An iron bridge costing $6,500 will be built over Spring River at Mammoth Springs, replacing the wooden structure.

Other Structures.

ABERDEEN, S. DAK.—The Chicago, Milwaukee & St. Paul, according to report, will build a new passenger station at Aberdeen at a cost of $25,000. Improvements are also to be made to the yards.

ATLANTA, GA.—Frank Weldon, promoter of the new car works which is to be located in Atlanta, says his company will be chartered in a few days. It is said that a site has already been decided upon.

BRANDON, MANITOBA.—The Canadian Pacific contemplates a number of improvements for which over $100,000 will be spent during the next 12 months. The work includes a new roundhouse, extensive coal sheds and an overhead bridge; also an extension of the track facilities.

BRISTOL, CONN.—The Bristol Motor Car Co., recently incorporated with $10,000 capital, has increased its capital to $40,000, and will at once build its proposed factory.

BUFFALO, N. Y.—A conference was recently held by the Presidents of all the railroads entering Buffalo to further the project for a union station in that city. It is said that the site most favored is that known as the Hamburg Canal.

DERBY, CONN.—The contract for the new station of the New York, New Haven & Hartford at Derby has been let to Wm. Paterson, of New Haven. The new building will be 104 x 30 ft.

ERIE, PA.—F. Felkel, Consulting Engineer and Architect, Pittsburgh, Pa., is receiving bids for the steel work for the foundry and power buildings of the Griswold Mfg. Co. in Erie.

HOUSTON, TEXAS.—The Gulf, Colorado & Santa Fe will build new freight terminals in this city, the work to be begun soon.

JOHNSON CITY, TENN.—The East Tennessee & Western North Carolina Railroad is planning to erect large shops here.

LOUISVILLE, KY.—The Southern Ry. is having plans made for new shops and a roundhouse to be built at Twenty-ninth and Alford streets. B. C. Milner, of St. Louis, Mo., is said to be making the plans.

NORFOLK, VA.—The Chesapeake Transit Co. has just completed negotiations for a large bond issue to build the proposed union station in Norfolk for all the roads entering that city. It also is to tunnel the Elizabeth River. (See also General Railroad News.)

NORWALK, OHIO.—Principal among the improvements to be made by the Wheeling & Lake Erie are the doubling of the shop capacity at Norwalk, a new coaling plant at Canton, a 10-stall roundhouse, a coaling and water station at Toledo and a roundhouse and other minor work at Mingo Junction.

ROME, N. Y.—The City Engineer's Department has received maps, etc., for the improvements to be made by the New York Central in Rome, which include a new station to be built 1,000 ft. east of the present one; also for a new freight house. The New York, Ontario & Western will also build a new freight house and passenger station. It is said the estimate of the improvements for both companies is $800,000.

SCHENECTADY, N. Y.—Contracts for two more large buildings for the Schenectady Works of the American Locomotive Co. have been let to John McDermott, who has done practically all of the work at that plant. The two buildings are an addition to the tank shop 250 x 175 ft., and an extension to the hammer shop 275 x 85 ft. They will be built of steel and brick.

TOLEDO, OHIO.—The Cleveland Cliffs Iron Co. is said to be considering building a blast furnace and sheet mill in Toledo.

TORONTO, ONT.—The Toronto Steel Co., and the Canada Foundry Co., both of Toronto, are new concerns formed to build a rolling mill and a structural steel plant in Toronto. There is a report that both of these companies are affiliated with the Dominion Iron & Steel Co., and that considerable of the pig iron product of the Dominion Company will be sent to Toronto.

WINNIPEG, MANITOBA.—T. R. Deacon, of the Manitoba Iron Works Co., which was recently incorporated, is reported as saying that sufficient capital has been secured to begin work on the new shops at Winnipeg.

WINONA, MINN.—Improvements are to be made to the Chicago & North Western shops in Winona, but nothing definite is decided. However, the work contemplated includes another locomotive repair shop. New machinery will be needed.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

New York Railroad Club.

A regular meeting of the club will be held at 8 p.m., Friday, Jan. 16, at Carnegie Hall, No. 154 West 57th street, New York city. The title of the paper to be read and discussed is "Cast-Iron Wheels to Meet To-day's Requirements."

Iowa Railway Club.

The Iowa Railway Club will hold its first annual and regular monthly meeting at Hotel Savery, Des Moines, Iowa, Jan. 20, at 7:30 p.m. Mr. Charles McEnery, of Cedar Rapids, will present a paper on "Best Method of Shimming Heaved Track, and How High Track Should be Shimmed in Safety for the Heavy Engines of the Present Day." Mr. W. L. Finnicum, of Des Moines, and Mr. Herm Wills, of Clinton, Iowa, will each present a paper on "Passenger Train Signals Between Conductor and Engineer."

The Club at this meeting will hold its annual election of officers and in addition there will be given a buffet luncheon and smoker. P. B. Vermillion, Secretary.

Central Railway Club.

At the annual meeting on Jan. 9 the election of officers resulted as follows: President, George W. West, Superintendent of Motive Power, Ontario & Western, Middletown; Vice-President, J. A. Barhydt, Master Mechanic, Buffalo, Rochester & Pittsburgh, Rochester; executive members, James MacBeth, Master Car Builder, New York Central, Buffalo; C. E. Turner, Superintendent Motive Power, Buffalo, Rochester & Pittsburgh, Rochester; L. B. Pomeroy, New York, special representative in the Railroad Department of the General Electric Co.; W. H. Rosevear, Jr., Chief Clerk of the Car Department of the Grand Trunk, Montreal; Secretary and Treasurer, Harry D. Vought; Assistant Secretary, B. M. Tate, Buffalo, Secretary to President Hewitt, of the Magnus Metal Co.

Western Society of Engineers.

The December number of the Journal of the Western Society of Engineers contains the following papers: "Modern Handling of Iron Ore on the Great Lakes," by Jas. N. Hatch; "The Yazoo Delta of Mississippi and Location and Construction of Its Railroads," by J. N. Darling; "Water Waste and Its Detection," by Edward S. Cole; "Fire Extinguishment in Chicago. The Fire Department," by Wm. H. Musham; "The Transmission of Fire Alarms," by Mrs. E. B. Ellicott; "The Need of Better Facilities for Research and Instruction in Agricultural Engineering," by Elwood Mead, Department of Agriculture, Washington, D. C.

The Society has established an Engineering Directory. The object of this is to bring together those persons who may be on the lookout for an engagement and those who desire the services of engineers. J. H. Warder, Secretary, will keep privately the names of applicants for positions.

Engineers' Club of Philadelphia.

At the meeting on Jan. 3, Mr. Charles Piez presented a paper on "The Handling and Storing of Iron-Ore." After quoting figures to show the increase in production and the decrease in cost of iron and steel since 1870, he described the methods of transporting the ore by steamer, especially on our great lakes, and the principal types of machinery for unloading these vessels and depositing the ore in cars or storage-bins, etc. The paper was illustrated by photographs of the different types of unloaders, conveyors, buckets, etc. It was afterwards discussed by Messrs. James Christie, Edwin F. Smith, J. Chester Wilson, A. C. Johnson and others.

PENNSYLVANIA RAILROAD IMPROVEMENTS.

Mr. Richard G. Develin exhibited and described for Mr. Joseph T. Richards a couple of lantern slides, showing the changes which have been made in the bridges, tracks and stations on the line of the Pennsylvania Railroad, between the east side of the Schuylkill River and 52nd street, West Philadelphia. The meeting then adjourned.

American Railway Master Mechanics' Association and Master Car Builders' Association.

The Secretary has sent out the following: The 36th annual convention of the American Railway Master Mechanics' Association and the 37th annual convention of the Master Car Builders' Association will be held at Mackinac Island, Mich. The Master Mechanics' Convention will be held on Wednesday, Thursday and Friday, June 17, 18 and 19, and the Master Car Builders' Convention on Monday, Tuesday and Wednesday, June 22, 23 and 24.

Headquarters will be at the Grand Hotel, which has made the following terms:

	Per day.	
Single room, one person, without bath	$3.00	
Double room, one person, without bath	4.00	
Ordinary double room, one person, with bath	5.00	
Extra large double room, one person, with bath	6.00	
Double room, without bath, two persons	3.00	each person
Ordinary double room, with bath, two persons	4.00	"
Extra large double room, with bath, two persons	5.00	"

In addition to the accommodations furnished at the Grand Hotel, arrangements have been made with other hotels to take care of such as desire rates ranging from $2.50 to $4.00 per day. These rates all being for the American plan. Members of the Association will have preference of rooms until March 15. Applications for rooms should be made to Mr. Henry Weaver, Manager Planters Hotel, St. Louis, Mo., and the committee of arrangements requests that the members should apply at once for rooms. The committee of arrangements consists of Messrs. W. H. Lewis, F. W. Brazier and Scott H. Blewett.

Canadian Society of Civil Engineers.

The annual meeting for the election of the Council for 1903 will be held at 877 Dorchester street, Montreal, as follows:

Tuesday, Jan. 27.—10 a.m. Meeting for the nomination of scrutineers, receiving the report of Council, and transaction of general business of the society; adjournment at 1 p.m. 3 p.m. By the kindness of Professor Cox, there will be an exhibition of the Liquid Air plant, and demonstration in the Physics Building at McGill University. Afterwards, by the courtesy of the Governors of the University, members are invited to an informal reception and afternoon tea in the Macdonald Engineering Building. 8 p.m. Address by the retiring President, Dr. M. Murphy.

Wednesday, Jan. 28.—10 a.m. General business and reception of the reports of scrutineers. 1 p.m. Informal luncheon. 2 p.m. Reading of technical papers. 8 p.m. Members' dinner.

Thursday, Jan. 29.—10 a.m. Reading of technical papers. 1 p.m. Informal luncheon.

The following papers have been announced for reading at the meeting: "Dam Construction and Failures During the Last 30 Years," by C. P. Baillairgé; "The Industries of the Consolidated Lake Superior Company," by E. G. M. Cape; "The Hydraulic Dredge King Edward VII.," by A. W. Robinson; "The Flow of Streams," by R. S. Lea; "Some Problems in Connection With the Erection of the Miramichi Bridge," by H. D. Bush; "On the Economy of Small Gas Engines Using Montreal Illuminating Gas," by H. M. Jaquays.

By the kindness of the Grand Trunk, Canadian Pacific, Intercolonial, Canada Atlantic, Central Vermont, New York Central, and Rutland Railroads, members and their families who shall have paid a full one-way first-class fare from Canadian points going to Montreal, will be returned free on presentation of a certificate signed by the ticket agent (from whom the certificate must be obtained) at the point of starting, and by the Secretary of the Society.

American Association for the Advancement of Science.

The 52nd annual meeting of this Association was held at Washington, D. C., on Dec. 29 to Jan. 3, inclusive, with about 500 delegates and a total of 975 members and about 400 guests in attendance. The first session was called to order Dec. 29 by the retiring President, Prof. Asaph Hall, U. S. N. At the afternoon session addresses were made by the Vice-Presidents of the several sections, among these being one by Prof. John J. Flather, Vice-President of Section D, Mechanical Science and Engineering, on "Modern Tendencies in the Utilization of Power," and one by Hon. Carroll D. Wright, Vice-President of Section I, Social and Economic Science, on "The Psychology of the Labor Question." On the second day an executive session of the officers of the Council was followed by a short general meeting, after which the meetings of the 10 different sections began, at each of which many papers were read and topics discussed. Among these Section A had a programme of 20 papers, beginning with one on "Deflections of the Vertical in Porto Rico" by Dr. O. H. Tittmann, Superintendent of the U. S. Coast and Geodetic Survey. Section B had a programme of 25 papers. Among the papers on the programme in Section D were those on "Agricultural Engineering" by Elwood Mead; "The Drainage Problems of Irrigation," by C. G. Elliott; "Theory, Construction and Use of a Pressure-Tube Anemometer," by A. F. Zahn, and "The Mechanical Problems of a New Ore-Producing Territory," by C. A. Waldo. In Section I several of the papers were of general interest as follows: "Remarks on Capitalization and Publicity," by Hon. Martin A. Knapp, Chairman of the Interstate Commerce Commission; "The Necessity of Organization Among Employers," by Mr. David M. Parry, President of the National Association of Manufacturers; "The Right of the Laborer to His Job," by Mr. Walter S. Logan, and "Recent Aspects of the Immigration Problem," by Prof. Roland P. Falkner, of the Library of Congress. Papers before the general meeting were also presented by Mr. Elmer L. Corthell on "The Growth of Great Cities," and by Mr. Bernard R. Green on "The Construction of the Washington Monument."

At the general evening meeting of the third day a paper was presented by Prof. Haupt on the needs and methods of securing much greater depths of water at our seaports, which considered in detail the conditions existing at a number of important ports and reviewed the experience in harbor work during the past 50 years, making the statement that the demands of commerce are not met in any instance. St. Louis was chosen as the place for the next annual meeting, which will begin Dec. 28, 1903. The following officers were elected: President, Carroll D. Wright, of Washington, D. C.; General Secretary, C. W. Stiles, of Washington, D. C.; Secretary of Council, C. S. Howe, of Cleveland, Ohio, and the following officers of the various sections: Mathematics and Astronomy—Vice-President, O. H. Tittman, Washington, D. C.; Physics—Vice-President, E. H. Hall, Cambridge, Mass.; Chemistry—Vice-President, W. D. Bancroft Ithaca, N. Y.; Mechanical Science and Engineering—Vice-President, C. M. Woodward, St. Louis, Mo.; Geology and Geography—Vice-President, I. C. Russell, Ann Arbor, Mich.; Social Science—Vice-President, S. E. Baldwin, New Haven, Conn.; Secretary, J. F. Crowell, Washington, D. C.

On the fifth day the morning was given up to papers and short discussions in the different sections, a number of the papers being on popular subjects, and in the afternoon Mr. John Hays Hammond gave a public illustrated lecture at the Lafayette Opera House on "King Solomon's Mines; or, The Mines of Ophir."

PERSONAL.

—Mr. Geo. H. Prescott, at one time Superintendent of Motive Power and Machinery of the Vandalia Line, died recently in Logansport, at the age of 76 years.

—Mr. B. C. Epperson, Superintendent of the Second Division of the Central of Georgia Railway, died Jan. 6, after an illness of several months. Mr. Epperson was born in Pulaski, Tenn., 57 years ago, and his service as a railroad man began in 1874 as a brakeman on the Southeastern Railway. He was appointed to the position he held at the time of his death in 1898.

—Mr. J. F. Enright, Master Mechanic of the Mobile & Ohio at Whistler, was born at Savannah, Ga., in 1867. He started his railroad service in 1885 on the Savannah, Florida & Western (afterwards the Plant System) as an apprentice. After remaining in the Savannah shops for 10 years he was promoted to be General Foreman of the Montgomery shops, later being transferred to Waycross, Ga., but shortly returned to Montgomery as Master Mechanic. As will be seen, Mr. Enright's whole experience has been with the Plant System, and dates back 17 years.

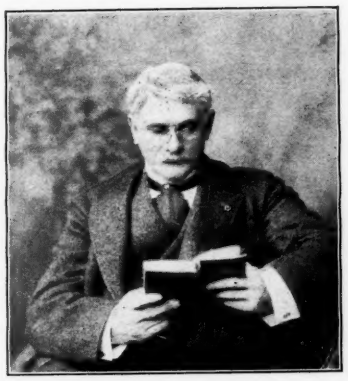
—Mr. K. P. Alexander, Master Mechanic of the Ft. Smith & Western, was born at St. Louis, Mo., Jan. 11, 1865. At the age of 13, Mr. Alexander entered a machine shop, at the same time attending the St. Louis Polytechnic Institute nights. He was a machinist for a number of years on the Missouri Pacific and the St. Louis & San Francisco. He was afterwards appointed Master Mechanic of the Kansas City Cable Railway. He was then appointed Division Foreman of the "Frisco" System at

Newburg, later being transferred to Ft. Smith, Ark. Mr. Alexander assumed his new duties on Nov. 30, 1902.

—Rear Admiral George W. Melville, U. S. N., Chief of the Bureau of Steam Engineering, was placed on the retired list of the Navy on Jan. 10, when he reached the age limit of 62 years. At the request of the President, Admiral Melville will remain as Chief of the Bureau of Steam Engineering until the expiration of his four-year term on Aug. 9, 1903. Admiral Melville was born in New York State and appointed to the Navy from that State July 29, 1861. His last sea service was in 1884, and he has been on his present duty since Aug. 9, 1887, this being his fourth term as a Chief of Bureau. The reader will find a sketch of his interesting and useful career in the *Railroad Gazette* of Dec. 9, 1898, when he was elected President of the American Society of Mechanical Engineers.

—Mr. J. Q. Barlow, the new Chief Engineer of the Western Maryland, was born at Bridgeport, Conn., in 1861, and is a graduate of the Worcester Polytechnic Institute, class of 1882. For four years (1882-1886) he was Assistant Engineer for the Northern Pacific, then for five years was with the Union Pacific as Division Engineer. During the year 1891-1892 he was Superintendent of Construction and Engineer of the Everett & Monte Cristo Railway. Mr. Barlow resigned from this position to become Chief Engineer of the Burrard Inlet & Fraser Valley Railroad. From 1893 to 1894 he was engaged on various railroads and public works in the State of Washington. The following year was spent on the Denver, Cripple Creek & Southwestern as Chief Engineer, and from 1897 until his new appointment he has held the positions of Division Engineer and Chief Engineer and General Manager of the Oregon Short Line (Union Pacific) and the Columbia Railway & Navigation Company. Mr. Barlow is a member of the American Society of Civil Engineers.

—General Samuel Thomas died in New York city Jan. 11. For a good many years he had been an important person in financial and railroad matters. Quite recently he was President of the Duluth, South Shore & Atlantic Railway. For a good while he was President of the East Tennessee, Virginia & Georgia. He had served also as President of the Chicago, Indianapolis & Louisville. He had served in the directory of many different railroads and of various other companies. At the time of his death he was director of the Canadian Pacific, the



Chicago, Indianapolis & Louisville, the Cuba Company, Duluth, South Shore & Atlantic and other railroad companies, as well as of many financial and industrial corporations. He was born at South Point, Ohio, in 1840. In 1861 he enlisted in the Twenty-seventh Ohio Regiment and became at once a Second Lieutenant, and by 1865 had become a Brevet Brigadier General. He remained in the service until January, 1867, the latter part of his military duty having been with the Freedman's Bureau. After leaving the service he went into business in Zanesville, Ohio, as a manufacturer of iron and of various railroad supplies. In 1872 he went to Columbus in charge of rolling mills and blast furnaces, and he gradually became interested in mining, but presently turned his attention to railroads and did a good deal of building as a contractor. He was one of the promoters of the New York, Chicago & St. Louis (Nickel Plate). He became known in New York as a financial power in 1880, when the late George I. Seney, President of the Metropolitan Bank, undertook the financial responsibilities of creating the system of railroads with which his name was identified, and which in 1884 brought about the failure of the Metropolitan Bank. Mr. Seney employed General Thomas and the late Senator Brice as his lieutenants; one in executive duties, the other in legal and organizing duties. The Ohio Central, the New York, Chicago & St. Louis, the Lake Erie & Western, and the East Tennessee, Virginia & Georgia, were the most notable of the railroads promoted by this syndicate. With the failure of the Metropolitan Bank came the discredit or bankruptcy of all of the group of enterprises, and a great shrinkage in the market value of their securities. General Thomas was able to take advantage of this depreciation and bought the principal assets of the Metropolitan Bank and laid the foundation of his own fortune in the subsequent rise in the price of the securities. When the effects of the panic of 1884 had subsided, he was thus in a position to enter on his own account upon large undertakings of construction and reconstruction, and he greatly increased his own fortune. By temperament and training he was essentially a re-organizer, with great capacity and judgment and great boldness and resource. The reorganization of the Central of Georgia, which involved interests of much magnitude and complexity, was successfully carried through by General Thomas almost unaided, and his profit from the operation was large. He was certainly not a popular man in financial circles, for he was bold and aggressive, and perhaps not always as scrupulous as he might have been, but he was a financial power and was acknowledged to have extraordinary versatility and force. His versatility led him far into other fields than finance. He read much, was a collector of books and pictures and took a lively interest in matters of original research. He had a beautiful country place on the original Revolutionary landing of Dobb's Ferry and took much interest in outdoor sports, particularly in yachting. He is said to have remarked that he could not be elected to any club in New York city, but in fact he was a member of several sporting clubs and also of the Union League, the Lotus and the Lawyers' Clubs.

ELECTIONS AND APPOINTMENTS.

Atlanta, Knoxville & Northern.—S. J. Anderson has been appointed Master Mechanic, with headquarters at Blue Ridge, Ga., succeeding A. J. Dunn, resigned to take a similar position with the Virginia & Southwestern.

Atlantic Coast Line.—W. J. McGee, heretofore General Foreman, has been appointed Acting Master Mechanic, with headquarters at Montgomery, Ala., succeeding J. F. Enright, resigned.

Baltimore & Ohio.—A. F. Hockenbeamer has been appointed Assistant to the General Superintendent of Motive Power, with headquarters at Baltimore, Md. The announcement made last week that the title of A. M. Kinsman had been changed to Assistant Engineer of Maintenance of Way is wrong. Mr. Kinsman's title remains the same, Engineer of Construction, with jurisdiction over all B. & O. lines.

Chicago & Eastern Illinois.—At a meeting of the Board of Directors, held recently, the following officers were elected: B. F. Yoakum, President; W. H. Lyford, Vice-President; R. R. Hammond, General Manager, and J. S. Ford, Secretary and Auditor. The office of Chairman of the Board has been abolished.

Chicago & North Western.—E. B. Thompson, heretofore Mechanical Engineer, has been appointed Division Master Mechanic, with headquarters at Mason City, Iowa, succeeding E. W. Pratt.

Chicago, Burlington & Kansas City.—W. Augustus has been appointed Master Mechanic, succeeding W. H. Bartlett, transferred.
See Hannibal & St. Joseph.

Colorado & Southern.—Charles Dyer, General Superintendent, with headquarters at Denver, has resigned.

Delaware, Lackawanna & Western.—R. F. McKenna has been appointed Superintendent of car shops, with headquarters at Scranton, Pa.

Denver & Rio Grande.—A. C. Hinckley has been appointed Master Mechanic, with headquarters at Denver.

Erie.—G. A. Richardson has been elected Assistant to the President, and D. Bosman Assistant Secretary.

Fonda, Johnstown & Gloversville.—J. N. Shannahan, heretofore Engineer, has been appointed General Superintendent, with headquarters at Gloversville, N. Y., and W. H. Collins, heretofore Acting Master Mechanic, has been appointed Master Mechanic.

Hannibal & St. Joseph.—H. Miller has been appointed General Superintendent of this company and the St. Louis, Keokuk & Northwestern; the Kansas City, St. Joseph & Council Bluffs and the Chicago, Burlington & Kansas City. Mr. Miller's headquarters will be at St. Louis.

Iowa & St. Louis.—W. G. Humphrey has been appointed Purchasing Agent, with headquarters at Connellsville, Mo.

Jamestown, Chautauqua & Lake Erie.—F. L. Chase, Bridge Engineer of the New York Central & Hudson River, has resigned to take effect Feb. 1, when he will take up the duties of President of the J., C. & L. E., and also of the Chautauqua Steamboat Company.

Kansas City, St. Joseph & Council Bluffs.—See Hannibal & St. Joseph.

Lehigh Valley.—L. H. Van Allen, Division Superintendent at Buffalo, will also assume charge of the operations of the Lehigh Valley Transportation Company.

Maricopa & Phoenix.—J. Walden has been appointed Auditor, with headquarters at Phoenix, Ariz., succeeding L. C. Masten, resigned.

Michigan Central.—The following Division Engineers have been appointed: G. Sharp, Division Engineer, with headquarters at Detroit; J. S. Pratt, Division Engineer at Bay City, and F. A. Hibbard, Division Engineer at Jackson.

Mobile & Ohio.—E. E. Torrey has been appointed Superintendent of Telegraph, with headquarters at Jackson, Tenn., succeeding K. McKenzie.

New York Central & Hudson River.—Charles E. Buchholz has been appointed Division Engineer of the River Division at Weehawken, N. J., succeeding H. C. Thompson, assigned to other duties. Charles E. Lindsay has been appointed Division Engineer of the Middle Division at Albany, succeeding Mr. Buchholz, and Allen W. Carpenter becomes Division Engineer of the Pennsylvania Division at Jersey Shore, Pa., succeeding Mr. Lindsay. J. M. Waldron has been appointed Acting Supervisor of Signals of the Middle Division, with headquarters at Albany, succeeding John Roberts, resigned, effective Jan. 10. Leroy H. Byam has been appointed Supervisor of Bridges and Buildings of the Pennsylvania Division. Stephen R. Payne, heretofore Acting Trainmaster, has been appointed Assistant Superintendent, with headquarters at Syracuse.

New York, New Haven & Hartford.—S. Taylor has been appointed Consulting Engineer, with headquarters at New Haven.

Ohio Central.—J. C. Homer has been appointed Master Mechanic, with headquarters at Kenton, O., succeeding C. J. Cooper, resigned.

Pennsylvania.—A. J. Whitney has been appointed Superintendent of the Western Pennsylvania Division, with headquarters at Allegheny City, Pa.
M. A. Malloy has been appointed Master Mechanic, succeeding W. Lininger, transferred.

Pennsylvania Company.—W. B. Blake, Engineer of Maintenance of Way of the Northwest System, has been appointed Assistant Real Estate Agent of the Southwest System, with headquarters in Pittsburgh. F. H. Worthington, heretofore Engineer of Maintenance of Way of the Cincinnati division (S. W. S.) succeeds Mr. Blake. H. E. Newcomet, Engineer of Maintenance of Way (S. W. S.) at Indianapolis, succeeds Mr. Worthington at Cincinnati. A. B. Jones, Assistant Engineer of Maintenance of Way of the Marietta division (N. W. S.), succeeds Mr. Newcomet, and Guy Scott has been appointed to be Assistant Engineer of the Indianapolis division (S. W. S.), succeeding M. C. Byers, resigned.

Pittsburgh, Carnegie & Western.—The officers of this company are: J. W. Patterson, President; W. J. Burns, Treasurer; T. B. Foley, Secretary, and J. T. Walsh, Assistant Secretary. (See R. R. Construction column, Dec. 5, p. 934.)

Pullman Company.—L. S. Hungerford has been appointed Assistant General Superintendent, with headquarters at Chicago, Ill., succeeding E. A. Jewett, resigned, and O. P. Powell has been appointed Commissary, succeeding G. Goldsmith, resigned.

St. Joseph & Grand Island.—W. T. Van Brunt has been elected President, succeeding W. L. Bull. G. G. Lacey was elected Treasurer and F. W. Russell, Secretary.

St. Louis & Hannibal.—E. O. Smith has been appointed Master Mechanic, with headquarters at Hannibal, Mo., succeeding M. T. Phillips, resigned.

St. Louis, Keokuk & Northwestern.—See Hannibal & St. Joseph.

Seaboard Air Line.—The Fourth and Fifth Divisions being very large a new division has been made, and the Fourth, Fifth and Sixth Divisions are now as follows: Fourth.—The line from Columbia to Jacksonville, and Jacksonville to River Junction, including the Jacksonville terminals, will be in charge of W. R. Hudson, Superintendent, Jacksonville. Mr. Hudson was promoted from the position of Trainmaster of the First Division. Fifth.—The line from Montgomery to Savannah, including the Savannah terminals, will be in charge of Walter Hale, Superintendent, Savannah, and the Sixth, all the Florida line south of Jacksonville and the Fernandina terminals, with D. E. Maxwell as Superintendent in charge, at Jacksonville.

Tennessee Central.—In addition to the duties of Assistant to the President, W. Mack Baxter has been appointed Mechanical Superintendent.

Texas & New Orleans.—C. F. Ressigue has been appointed Superintendent, with headquarters at Houston, Tex.

Texas Midland.—T. E. Corley, Treasurer, has been appointed Auditor also, succeeding D. S. Willard, resigned.

Virginia & Southwestern.—See Atlanta, Knoxville & Northern.

Washington & Franklin.—G. F. Baer (President of the Philadelphia & Reading) has been elected President of the W. & F.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BALTIMORE & OHIO.—Classification yards, with a capacity of 600 cars, have been authorized by this company at Demmler, Pa. The yards are to be built for the purpose of benefiting the Braddock plant of the United States Steel Co. The feature of the work will be the building of a through track from McKeesport to Braddock to be used entirely for shifting engines. Between these two places there will be five main lines, two being for passenger engines, two for freight and the fifth for shifting service.

BINGHAMTON-WILLIAMSPORT.—It is reported that this road, which was building in 1899 and which was practically washed away in the flood of that year, is about to be rebuilt. The line surveyed runs from Sullivan County to Dushore, Pa., along Loyalsock Creek to the West Branch Valley.

CAMBRIA-BLACKSBURG (VIRGINIA).—A new road is reported building between the above named points in Virginia, through the extensive coal fields of the Price mountains, Montgomery County. A company has been formed which has bought up all the coal lands in that section. Prof. L. S. Randolf, of the Virginia Polytechnic Institue, is President. Grading is reported completed, and track laying will begin shortly.

CANADA ATLANTIC.—Application will be made at the next meeting of the Dominion Parliament for authority to build a line from Whitney to Sault Ste. Marie, Ont., a total distance of about 290 miles.

CEDAR FALLS & NEW HARTFORD.—This company has been incorporated in Iowa to build from Cedar Falls to New Hartford, Iowa, 10 miles.

CENTRAL ONTARIO.—It is reported that nothing has been decided with regard to the proposed extension from Bancroft to Whitney, and that there is no prospect of beginning work for some time. (Dec. 12, 1902, p. 954.)

CHARITAN, KNOXVILLE & SOUTHERN (ELECTRIC).—This company was recently organized in Iowa to build an electric line from Knoxville, Iowa, to Charitan, Iowa, 28 miles. S. H. Mallory, T. M. Stuart, J. A. Brown, J. A. Peench, of Charitan, are incorporators.

CHICAGO GREAT WESTERN.—The new extension of 25 miles from Zumbrota to Rochester will be ready about the first of February. When this new line is opened, the Chicago Great Western will have a line from Red Wing to Osage, Iowa. There is now a line from Red Wing to Mankato, and the part of that line between Red Wing and Randolph will be used as a link for the through train service between St. Paul and Osage.

CHICAGO, ROCK ISLAND & PACIFIC.—The extension from Lawton to Waurika, Okla. T., a distance of 40 miles, has been opened for traffic. The new line connects with the main line at Waurika, thus forming a direct route to Dallas, Texas.

COLUMBIA SOUTHERN.—This line, which is being located between Shaniko and Bend, Ore., 100 miles, has been completed and work will begin at once. E. E. Lytle is President; A. E. Hammond, Portland, Ore., is Chief Engineer. (July 25, 1902, p. 600.)

DES MOINES, IOWA FALLS & NORTHERN.—By completing its line from Iowa Falls to the city limits of Des Moines, Iowa, before Jan. 1, 1903, this road has earned a subsidy of $76,000. This tax was voted by the townships in Story County to aid the railroad in building its line, the conditions being that it must be completed before Jan. 1, 1903, or forfeit the $76,000. (Dec. 19, p. 972.)

DETROIT, SANILAC & BAY CITY.—This line is projected to run from Detroit through Lenox, Memphis, Yale, Peck, Sanilac Center, Elmer City, Snover, Cass City, Colwood, Columbia, Ackron, Quanicassee to Bay City, a distance of about 180 miles. C. R. Lovejoy, of Lenox, Mich., is said to be interested.

Eastern of New Mexico (Atchison, Topeka & Santa Fe).—Contract for grading the first 60 miles from Belen to Willard has been let to D. Lantry & Sons, Strong City, Kan. This road is projected from Texico, on the Pecos Valley, to Rio Puerco. For map, see Nov. 14, 1902, p. 882.

Elizabethport, Amboy & Long Branch.—This company was incorporated in New Jersey on Jan. 9 to build between Elizabeth and Long Branch. Edwin Furman, W. Parker Runyon, of Perth Amboy, and Andrew Kirkpatrick, of Newark, N. J., are interested.

Grays Run.—Charter was granted this company in Pennsylvania on Jan. 2. It proposes to build a line 20 miles long from a point near Roaring Branch, on the Northern Central, to the mouth of Grays Run, Lycoming County. C. S. Wharton, Williamsport, Pa., is President; C. B. Farr, A. E. Botchford and M. F. Hammond, all of Williamsport, are directors.

Green County.—It is reported that the contract for 51 miles of new track will be let early in the spring. The proposed route is from Bishop to Houston, through Washington and Prosperity to Sycamore, Waynesburg and along the Monongahela River to McCann's Ferry. There will be five tunnels. J. T. Blair, Greenville, Pa., is President.

Guyandotte Valley.—Surveys are reported completed for a branch of this road along Big Creek to a point near Madison, W. Va., extending into one of the large coal fields in the State.

Hillsboro & Northwestern.—The line between Hillsboro and Union Center, four miles south of Elroy, Wis., has been opened for traffic. (April 4, p. 258.)

Holly & Hackers Valley.—This company has been incorporated in West Virginia to build from the fords of Holly River to Sutton, W. Va., a distance of 15 miles. J. H. Brewster, Weston, W. Va., and W. E. Hines, of Sutton, are interested.

Illinois Central.—Surveys are reported on the extension of this line from Brook Haven through Lincoln, Lawrence and Marion Counties, Miss., touching at Monticello and Columbia, and thence in a southerly direction to Lake Ponchartrain, passing through Washington, St. Tammany Counties, La. The entire line will have a total of about 100 miles and will run through a rich timber section. (Oct. 3, 1902, p. 766.)

Imperial & Gulf.—The proposed route of this road from Old Beach to Imperial, Cal., 27 miles, has been completed as far as Salton Crossing, 12 miles from Old Beach. The remainder of the road will be finished in the early spring.

Indianapolis Northern Traction.—Contract for the 20 miles between Peru and Kokomo, Ind., has been let to J. N. Beck. Work will be begun early in the spring. For map of the present system of this company, see *Railroad Gazette*, June 27, 1902, p. 520.

Klamath Lake.—Grading has been completed on this road to a point on the summit of the Cascade Range, 18 miles from Lairds. Cars are now running between Fall Creek and Lairds, 12 miles. The entire route from Lairds, Cal., to Pokegama, Ore., 28 miles, will probably be finished by July 1, 1903. (Aug. 15, 1902, p. 650.)

Knoxville, La Follette & Jellico.—The following branches are now being built by this road: From the State line to Knoxville, 74 miles; from Hickory Creek up the Clear Fork River, six miles; Oliver Springs branch from Dossett, Tenn., to head of Cow Creek, 12 miles. Surveys are being made up the Cumberland River in Campbell County, Tenn., and Bell County, Ky., to Chenoa, 17 miles.

Leslie & Southern.—An officer writes that the proposed route of this road will run through Heber, Quitman and Little Rock, a distance of 70 miles. Prospects for building are good but no track has as yet been laid. S. W. Lee, Harrison, Ark., is Chief Engineer.

Mayron & Gulf.—An extension of 34 miles from a point on the Inverness & Coal Co.'s line, to a point on the Intercolonial at Orangedale, is projected. A line will also be built from a point near Point Tupper, N. S., to Port Richmond, a distance of about five miles. The grading will be done by the company's forces under the charge of its Chief Engineer, F. R. Page.

Mexican Central.—A contract has been signed by the attorney of this road and the Mexican Government for the extension of the Cuernavaca line to the Pacific Coast. By the terms of the new concession, the Mexican Central is authorized to build from Rio Balsas, the present terminus of the Cuernavaca, to either Acapulco, 70 miles, or Zihuatanejo, 120 miles.

Mitchell, West Baden, French Lick & Jasper.—Surveys have been completed and right of way secured for this new road from Mitchell to Jasper, Ind. Work will be begun immediately. Geo. W. Clason, of St. Louis, is interested. (Nov. 14, p. 882.)

Mobile, Jackson & Kansas City.—Press reports state that work will be begun very shortly on the section between Laurel and Newton, Miss., 40 miles. Right of way has been secured for the greater part of the distance, and the contract for the first section has been let. F. B. Merrill, of Mobile, is President.

Morning Star.—The time allowed for building one-tenth of this line has expired, but an extension of time to Dec. 5, 1903, has been granted by the State Board of Incorporations in Arkansas. The proposed route is from Newport to Yellville, Ark., through the Counties of Marion, Baxter, Stone, Jackson and Independence. C. Williams, of Rush, Ark., is interested.

Muscogee Southern.—Contract for 71 miles southeast, and 47 miles northwest of Muscogee, has been let to the Kenefick Construction Co. C. N. Haskell, President of the Ozark & Cherokee Central, is also President of this road.

New Mexico & Pacific.—Surveys for the new line between Elizabethtown and Raton, N. Mex., a distance of 50 miles, have been completed. It is reported that grading will commence about Feb. 1.

Oklahoma & Texas Southern.—This company has been reorganized, and work on the line from Red River to Stephensville, Texas, 125 miles, will be rapidly pushed. About 10 miles from Red River have been graded, and the whole route located. W. A. Squires, Henrietta, Texas, is President; T. L. Garrison, General Manager, and McKeon Johnstone, Chief Engineer. (Aug. 8, 1902, p. 632.)

Pacific & Idaho Northern.—This road is now running between Weiser and Council, Idaho, 60 miles. An extension to Meadows is projected. N. W. Bethel, Weiser, Idaho, is Chief Engineer.

Pittsburgh, McKeesport & Connellsville.—An extension of the Leisenring Division of this road from Vanderbilt to Dawson is projected. The entire system in the coke region is now rapidly being connected. The line between Scottdale and Mount Pleasant is practically completed, and the line between Scottdale and Connellsville is finished with the exception of one steel viaduct between Connellsville and Uniontown. Work is in progress and grading is well under way.

Quebec & Lake Huron.—It is stated that work will soon be begun on this new road. The proposed route is from Quebec to a point on the French River near Lake Huron, a distance of about 50 miles. J. P. Cannon, of the First National Bank of New York, is financing the project. E. F. Wing and N. E. Evans are the engineers.

Raleigh & Eastern North Carolina.—Application has been made by this company to the Legislature of North Carolina for a charter to build from Raleigh via Granville and Wilson to Washington and to the coast, 120 miles. E. B. Barbee and Joseph Daniels, of Raleigh, N. C., are incorporators.

St. Louis & San Francisco.—The grading for the double track from San Francisco to San Jose has been completed to Lawrence, six miles from San Jose. The track is laid as far as Palo Alto.

St. Louis Valley Transportation.—This company has been incorporated in East St. Louis to build from the Waterloo and East Carondelet toll roads, in a westerly direction to the Mississippi River. It is also proposed to build a branch from Prairie to Du Pont Commons in a northerly direction. The incorporators are W. S. Foreman, M. C. McLean and Daniel Sullivan, all of East St. Louis.

San Pedro, Los Angeles & Salt Lake.—The new line from Los Angeles to Pomona, Cal., a distance of 31 miles, has been completed. An extension from Pomona to Riverside, 26 miles, is now building. The proposed route of this road is from Salt Lake City, Utah, to San Pedro, Cal., 1,100 miles. Senator W. A. Clark, of Montana, is President; R. C. Kerens, St. Louis, Vice-President.

Suffolk & Carolina.—See Railroad News.

Tallulah Falls.—Work on the branch of this road from Cornelia to Franklin, N. C., 60 miles, is progressing rapidly, and the entire line will probably be in operation by next summer. The new line runs through some valuable hardwood timber lands and will be of great advantage to the companies who own property in this vicinity. (Aug. 1, 1902, p. 616.)

Toledo, Port Clinton & Lakeside.—It is announced that this road, which is to run from Toledo to Lakeside, will run through Williston, Martin, Genoa, Elmore, Oak Harbor, Port Clinton and Piccolo, a total distance of about 50 miles. A spur will be built to Catawba Island. (Jan. 2, p. 18.)

United Railways (Baltimore).—It is reported that this company will build an extension from Sparrows Point to the shore of Chesapeake Bay. A special meeting of the stockholders will be held on Jan. 26 to ratify the lease of the Baltimore, Sparrows Point & Chesapeake for 999 years.

Valmont Incline Plane.—Application has been made for a charter for this company to build over Cove Mountain from Fort Loudon to McConnellsburg, Fulton County, a distance of nine miles. D. H. Patterson, E. H. Taylor, McConnellsburg, are interested.

Wabash.—At a meeting of the engineers of the Pennsylvania and Wabash railroads at Pittsburgh on Jan. 8, the following compromise with regard to the elevation of tracks was effected between the two interests. The Pennsylvania planned to have its tracks 741 ft. above tide level, but has conceded two feet and agreed to place them at a 739 ft. elevation. The Wabash desired to build its tracks 753 ft. above tide level, but has conceded three feet, which will place them at a 756 ft. elevation. This gives the Pennsylvania a clearance of 17 ft., which is said to be sufficient. The agreement as to grade, however, still leaves the Wabash in the same place where last week's Supreme Court decision left it. It must get its ordinance through both branches of the city council and have it signed by the Recorder before it can enter the city limits.

Washtucua-Odesso (Washington).—It is reported that an electric line will be built between Washtucua, Ritzville and Odesso, 45 miles. C. Lunchford and P. R. Clark, of Ritzville, Wash., are said to be interested.

Western Maryland.—The 65-mile link between Cumberland and Cherry Run, W. Va., has been definitely located. It follows the Potomac River for almost the entire distance and crosses the stream three times. This is made necessary owing to the number of turns in the river. It is proposed to build a double track for the entire distance, and it is reported that bids for grading will be asked within the next 30 days. John Barlow, Cumberland, Md., is Chief Engineer.

Press reports state that this road has been buying options for the right of way for an extension from York, Pa., to the Susquehanna River. Two routes are reported secured. Both will touch the river nearly opposite Marietta, Lancaster County. S. A. Gallatin has been negotiating for the rights of way.

GENERAL RAILROAD NEWS.

Au Sable & Northwestern.—It is reported that this road has been bought by some Chicago capitalists and will be changed to standard gage. It is also stated that an extension to Bay City and Lake Michigan will be built. The line now extends about 60 miles north from Au Sable, Mich.

Boston & Maine.—A petition has been sent to the Massachusetts Legislature by this road, asking for authority to purchase the Vermont Valley R. R. on behalf of the Connecticut River road. The Vermont Valley extends from Brattleboro to Bellows Falls, Vt., 26 miles. It is now operated by the Boston & Maine on a guarantee of 6 per cent. on the stock of $1,000,000.

Chesapeake Transit.—A mortgage for $2,500,000 has been filed by this company with the Colonial Trust Co. of Pittsburgh. Sixty thousand dollars of this amount will be issued for the purpose of cancelling $50,000 bonds now outstanding. The remainder it is reported will be used to build a tunnel under the Elizabeth River between Portsmouth and Norfolk and a terminal station in Norfolk. This tunnel would give the Southern, New York, Philadelphia & Norfolk, Chesapeake & Ohio, Seaboard Air Line, and all other roads entering Norfolk, a new entrance under the river to a Union Station in Norfolk.

Chicago, Rock Island & Pacific.—This road has been admitted to the Terminal Railway Association of St. Louis. It has lately purchased the Wiggins Ferry and the control of the St. Louis, Kansas City & Colorado. These are now to be owned jointly by the members of the Terminal Association. Until lately the control of the Terminal Association has been owned by the Cleveland, Cincinnati, Chicago & St. Louis, Louisville & Nashville, Baltimore & Ohio, Missouri Pacific, Wabash, St. Louis & San Francisco, St. Louis, Iron Mountain & Southern, Terre Haute & Indianapolis (Pennsylvania System). The roads just admitted are the Chicago, Rock Island & Pacific, Chicago, Burlington & Quincy, Illinois Central, Chicago & Alton and the Southern. The Terminal Association operates the St. Louis Bridge & Tunnel Terminal Ry., the St. Louis Merchants Bridge & Terminal, the new Union Station, belt lines and tracks in St. Louis and East St. Louis, the Madison, Illinois & St. Louis, the East St. Louis Street and the East St. Louis & Carondelet. Control of all these different lines are now vested in the 13 railroads mentioned above.

Denver & Rio Grande.—The Rio Grande Western has been absorbed by the above company. The lines were practically consolidated over a year ago, but the name of the Rio Grande Western was retained until the beginning of the new year. It will form the Western Division of the Denver & Rio Grande System.

Great Falls & Canada.—This company is now a part of the Great Northern. It was formally taken over on Jan. 3.

Interborough Rapid Transit.—Harvey Fisk & Sons have issued a circular containing some details of the property, business and earnings of this company. Incorporated with a capital of $25,000,000 to build a rapid transit subway railroad in New York city, it has since raised its capital to $35,000,000, the extra $10,000,000 being necessary to pay for the Brooklyn extension. At present $13,600,000 is full paid, the balance is 50 per cent. paid, second payment to be made before July 1, 1903. The mileage will be 25 miles, single track 65 miles. There will be 58 stations. The route of the Interborough Rapid Transit Company was carefully traced in the *Railroad Gazette* of Nov. 7, 1902, p. 864. This company takes over the operating lease of the Rapid Transit Subway Construction Company, which obliges it to work for 50 years the Rapid Transit Railway (underground) now building in New York. The terms of that lease are well-known. The Interborough Company has also leased the Manhattan (Elevated) for 999 years, to date from April 1, 1903. The rental is to be equal to net earnings of the Manhattan Co., not less than 6 per cent. and not exceeding 7 per cent., until Jan. 1, 1906. After Jan. 1, 1906, to be 7 per cent. (Dec. 5, p. 934.)

Manistee & Grand Rapids.—It is reported that this road is to be taken over by the Grand Rapids & Indiana. The purpose given is to develop a harbor on Lake Michigan for ore and coal shipments. The Manistee & Grand Rapids extends between Manistee and Rolfe, 59 miles, and from Tustin, Mich., to Manistee harbor.

New Orleans Railways.—A mortgage has been filed by this company with the New York Security & Trust Co. on all the property and franchises of the various street railways in New Orleans, to secure an issue of $40,000,000 of 4½ per cent. gold bonds.

North Carolina Roads.—W. J. Edwards, of Sanford, N. C., has been appointed Receiver of the Southern Sawmills & Lumber Co., Atlantic Seaboard Construction Co., and Carolina Northern. These companies went into temporary receivership in December, 1902. (Dec. 12, 1902, p. 954.)

Northern Securities.—This company has again granted to stockholders of the Great Northern the privilege of selling their holdings at $180 a share and receiving in exchange Northern Securities stock at par. The terms are the same as in the former offer of November, 1901. The date set for expiration of such privilege is Jan. 24. (See *Railroad Gazette*, Nov. 22, 1901, p. 816.)

Ozark & Cherokee Central.—It is reported that this company will shortly increase its capital stock to $10,000,000 for the purpose of absorbing the Shawnee, Oklahoma & Missouri Coal R. R. and the extension of the Ozark line from Fayetteville.

St. Louis & San Francisco.—The Chicago & Eastern Illinois has been absorbed by this road and in future its earnings will be computed along with the earnings of the St. Louis & San Francisco. President Yoakum announces that options on the Carondelet Canal in New Orleans have been obtained for terminal purposes. No official statement, however, has been given out with regard to the reported line which the St. Louis & San Francisco is said to be projecting into New Orleans.

St. Louis & Suburban.—The Secretary of the State of Missouri has issued certificates of authority to this company to increase its capital from $3,000,000 to $7,500,000. (Oct. 17, 1902, p. 806.)

Suffolk & Carolina.—J. Wm. Middendorf & Co., Baker, Watts & Co., Wm. C. Seddon & Co., and the International Trust Co., all of Baltimore, offer at 95 and interest $500,000 first consolidated 5 per cent. $1,000 gold bonds, dated July 1, 1902, and due 1952, subject to call at 110. International Trust Co., of Maryland, trustee. The *Commercial and Financial Chronicle* says that the total authorized issue of these bonds is $1,000,000, of which $100,000 is held by the trustee to retire $90,000 first 6 per cents, now outstanding; $400,000 to be held by the company for acquisitions and improvements. The amount of the new bonds issued is $500,000. These bonds are to be used (1) to build an extension of 17½ miles to Edenton, N. C., and one of 25 miles to Elizabeth City; (2) to broad gage the entire road; (3) to substitute 60-lb. steel rails for all lighter ones now in use; (4) to take up $70,000 of the first mortgage 6 per cent. bonds at $100. A branch of five miles from Ryland to Montrose Landing has been abandoned and the part from Ryland to Edenton has recently been added, making the total length of road now in operation 50 miles.

Terminal Association of St. Louis.—See Chicago, Rock Island & Pacific, above.